Student Journey Configurator Prototype: An application of Usability Engineering Concepts

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Abstract: *Usability Engineering aims to improve the user experience by utilizing different techniques and methods. It mainly focuses on assessing the user behaviour characteristics in order to address them during the development stages of products and services. The user requirements and needs are being defined with the help of tools such as Personas, User Stories and Use Case Diagram. This paper documents the steps we have performed in order to test usability of our prototype for the Student Journey Configurator. The iterative testing lasted three rounds during which testers interaction with the prototype was observed. An interview was conducted with the testers after this to determine their thoughts about the prototype. The final prototype was improved based on the feedbacks and unimplemented suggestions have been documented for future development.*

Keywords: Usability Engineering, Persona, User stories, Usability Testing

1. Introduction

This study is devoted to the Student Journey Configurator platform in the framework of Managing the Digital Transformation – Digital Education Ecosystem (ManDEE). Additionally, it is aimed to support the students who are planning to start their studies in the EuroPIM (European Partnership for Project and Innovation Management) program, which is one of the largest university partnership consortiums in the sphere of project management. The partner universities are from Bilbao (University of the Basque Country, UPV, Spain), Leuven (KU Leuven, Belgium), Kaunas (KTU Kaunas, Lithuania) and Trondheim (NTNU, Norway).
The platform itself is meant to provide easy-to-use access platform through which the prospective students could configure their studies in different aspects such as which type of specialization they want, whether or not they want the double degree and in which area, whether or not the students have work experience and so on. As a result, the overview of list of courses by semesters is provided, as well as with the list of workshops (with respective time of provision) and recommended links for student career services available from EuroPIM partner universities.
The main aim of this project is to develop a prototype of Student Journey Configurator and provide the usability tests with derived group of users. The underlying point is an attempt to reflect on the main pinpoints of usability engineering while conducting and developing the prototype of the platform.
The structure of paper is as following: Section 2 is devoted to explaining Personas and their main characteristics; Section 3 focuses on User Stories and Use Case Diagram; Section 4 provides an overview of Student Journey Configurator prototype; Section 5 represents the application of Usability Testing and its phases; Section 6 is providing the comparison of Before and After states of iterative prototyping; Section 7 is providing the summary and conclusion.

2. Personas

Focusing on specific or canonical users is suggested by the persona's method. The idea is to create a product that is tailored to a variety of people, generally a few dozen, who represent typical customers [1]. "Personas are fictional user archetypes based on user research. Through a process of analysis and refinement, the data from user interviews is distilled into one or multiple fictitious characters." [1].
To begin, the group has created two key personas to address their wants and requirements during the prototype's development. The first identity is Ayaan Jayawardane, a recent bachelor's graduate in engineering from Colombo, Sri Lanka. He is currently unemployed. During his studies, he worked as a junior software engineer intern at Facebook. He had the opportunity to lead a short project with other team members and then present the product pitch to the supervisors. He realized at that time that he wants to improve his project management skills and is aiming to continue his studies, specifically in that subject. The information about this persona can be seen below (see **Fig. 1**).

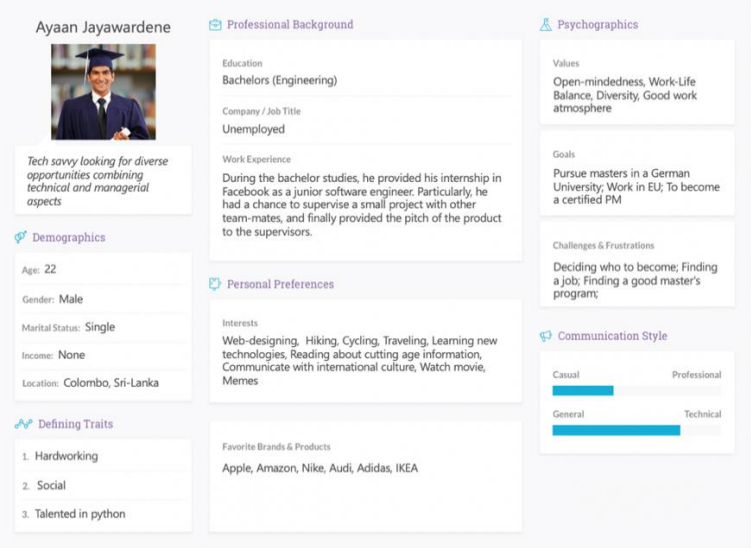

Fig. 1. Persona Type 1 for Student Journey Configurator

Alina Karimi, from Teheran, Iran, is the second persona type. She chose to work in IT sales after finishing a bachelor's degree in engineering. She worked as a Digital Marketeer for Boomrang Company for 5 years before leaving to follow her goal of starting her own company. After researching on how to establish her own business, she concluded that she lacked skills in that area. In this regard, she applied for the EuroPIM program, which offers a dual degree specialty in project management and innovation and entrepreneurship. The information about Persona Type 2 is described below (see **Fig. 2**).

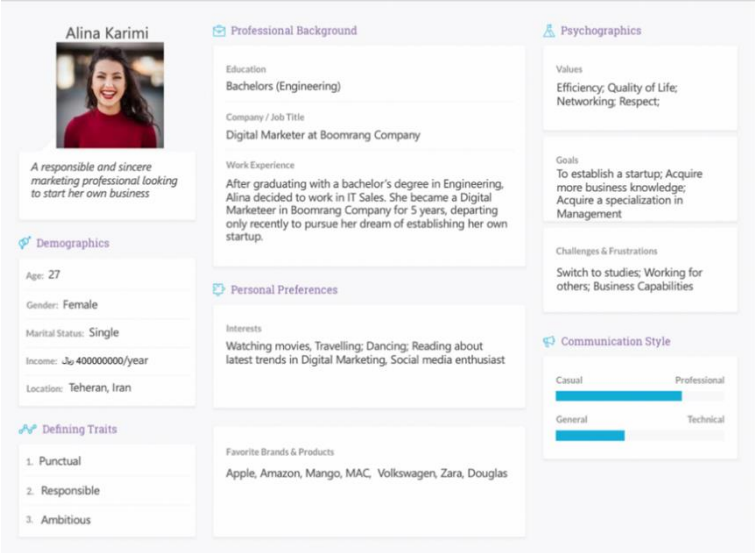

Fig. 2. Persona Type 2 for Student Journey Configurator

3. User Stories and Use Case Diagram

User stories are a technique of determining "high level requirements" from the perspective of the user [2]. We have used an "Agile User Story Template" to list our user stories (see **Table 1**). We have identified Student as a primary user for the Student Journey Configurator. User Story ID's 1-6 represent the common use cases of both the personas (Ayaan and Alina). User Stories 7 and 8 are specific to persona 1 (Ayaan) whereas the user stories 9 and 10 are specific to persona 2 (Alina).

Table 1: User Story Template

User Story ID	**As a <type of user>**	**I want to <perform some task>**	**So that I can <achieve some goal>**
1	<class> Student	Find Learning Path to a Specialization	Acquire a degree in that Specialization
2	<class> Student	Be reminded of upcoming deadlines for document submission	Complete submission of files (documents) on time
3	<class> Student	Find out about Double Degree Programs	Decide whether I want a double degree
4	<class> Student	Enroll in a double degree from a partner university	Acquire a Double Degree
5	<class> Student	Participate in exchange program	Attend a semester abroad
6	<class> Student	Get an overview of my Study Plan	Plan/Schedule my studies
7	<sub-class> Student Persona 1	Be specialized in Project Management	Become a certified PM
8	<sub-class> Student Persona 1	Further continue my studies in the sphere of PM	Pursue a PhD program in PM
9	<sub-class> Student Persona 2	Have better networking in business sphere	Utilize it for creating my startup (investments, partners, etc.)
10	<sub-class> Student Persona 2	Find programs, courses and workshops that are suitable for me	Ease the process of studying and increase and enhance my job skills

We have also created a use case diagram (see **Fig. 3**) to depict the possible users and their relationships to the Student Journey Configurator. Another user of the system is "Executive

Program Director" who is responsible to perform administrative tasks. We have considered student as the primary user when designing our prototype.

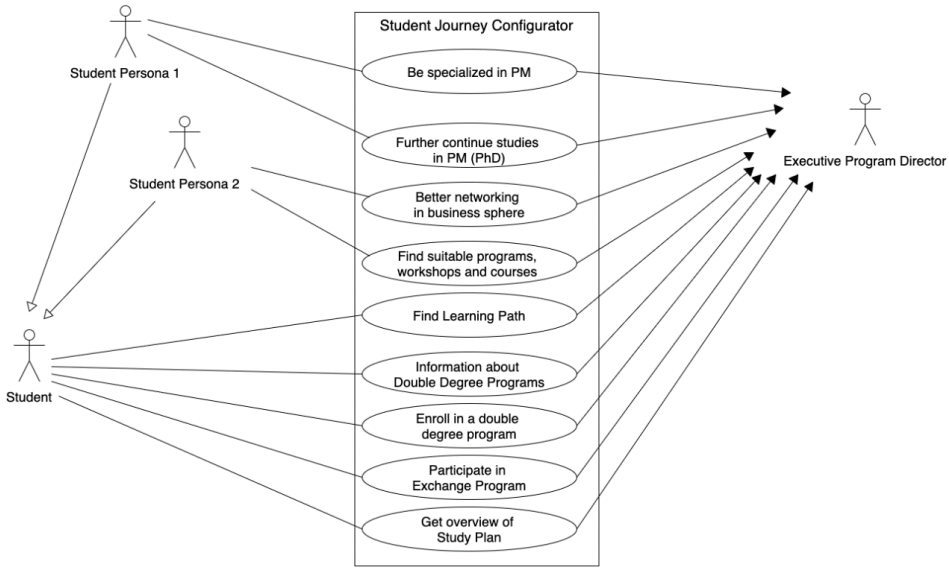

Fig. 3. Use Case Diagram

4. Prototype Design

As defined by Beaudouin-Lafon and Mackay "A prototype is a tangible artifact, not an abstract definition that requires interpretation" [3]. We decided to use Balsamiq's wireframe[1] to design our prototype. For the Student Journey Configurator, we created 10 wireframe screens consisting of browser windows. Each wireframe screen will be described in this section along with the navigation.

The figure below (see **Fig. 4**) shows the design of the first wireframe, the welcome page. This is the first page users will see once they login. There are options for language change, help and account settings on the top right corner. The button "Start Student Journey Configurator" launches the tool.

Once users click on this button, they will be redirected to the specialization page, which is shown in the figure below (see **Fig. 4**). Users can select a "specialization" of their choice from the options listed here. These are "Project Management", "Innovation and Entrepreneurship", "Digital Transformation" and "Sustainability". Users can also find more information about these programs from the hyperlink "Learn more about EuroPIM Specializations". Once a choice is finalized, users can click on the button "Save & Next" to navigate to the next page.

The next page is the double degree page (see **Fig. 5**) which allows the users an option to choose a double degree from a partner university. A short description is given on the top of the page about double degree programs. If users select answer "Yes" in the first question, they can choose their specialization for the second degree from the second question in this page. Once all answers are selected, users can click on the button "Save & Next" to move to the next page. There is also a "Previous" button to navigate them to the previous page.

[1] https://balsamiq.com/wireframes/

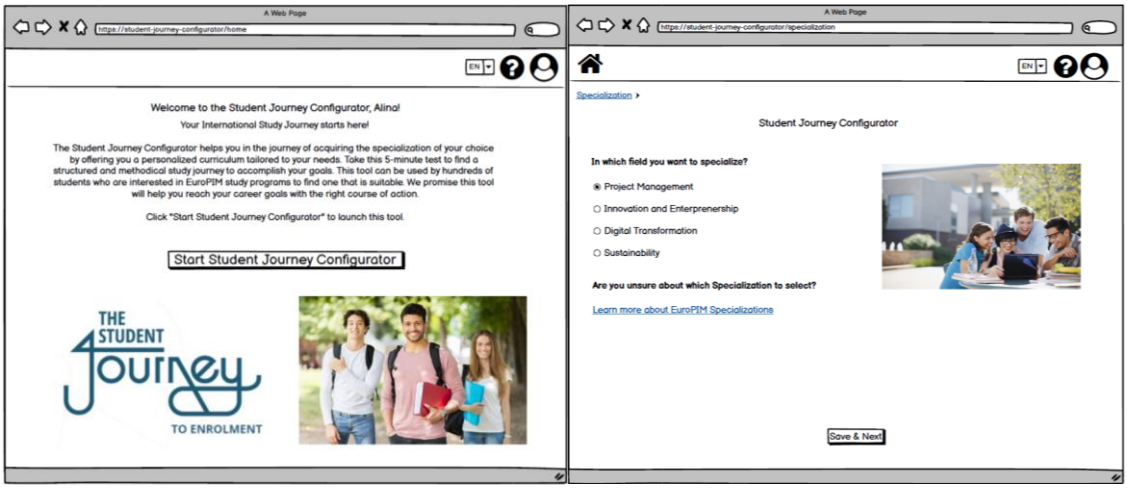

Fig. 4. Wireframe 1 (Welcome Page) and Wireframe 2 (Specialization Page)

The next page is the electives page (see **Fig. 5**) which gives the users an option to select electives of their choice from a list of options. It also contains a hyperlink "Learn more about Electives". This redirects them to the electives module page where they can find detailed information about these courses. The buttons at the bottom of the screen helps the users navigate back and forth.
The next page (see **Fig. 6**) is about a question related to Exchange Program. If users are interested to study a semester abroad, they can select the option "Yes". If they require more information about electives, they can find so from the hyperlink "Learn more about exchange program". Once they click on "Save & Next" button, they will be redirected to the next page (see **Fig. 6**). This page is about work experience. Users can select the option which is applicable for them among the options provided. If they have some work experience, they can describe it in detail in the text area as shown. Once they have added their inputs, they can click on "Save & Next" button to move to the next question.

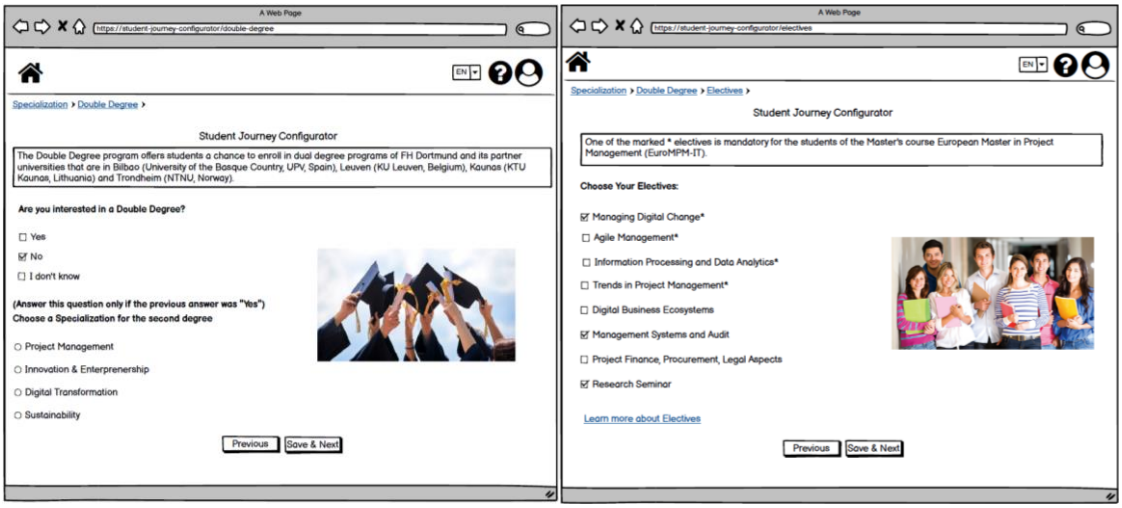

Fig. 5. Wireframe 3 (Double Degree Page) and Wireframe 4 (Electives Page)

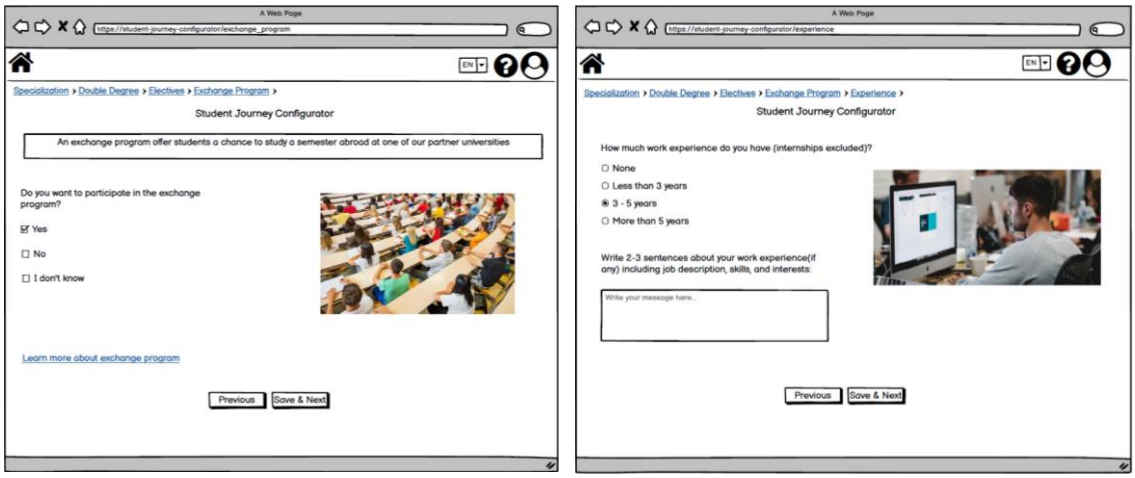

Fig. 6. Wireframe 5 (Exchange Program Page) and Wireframe 6 (Work Experience Page)

The next page (see **Fig. 7**) is about "Extracurricular Activities". It describes a list of different courses that are conducted during the semester break via the career service. These modules are not compulsory for the students; however, they can enroll in them to enhance their skills. Users can select none, some or all courses based on their preference. If users are looking forward to enroll to a particular course which has not been listed in this page, they can write a message to the administrators using the text area to inform about their preferences. Once they save their choices, the users will be redirected to the "Preview" page (see **Fig. 7**). This page displays all the answers which the users have selected for each question. If they want to change any answer, they can click on the "Go Back" button to navigate to the previous pages and update their answers. Once they are happy with all the answers, they can click on the "SHOW RESULTS" button to see the outcome of the Student Journey Configurator tool. This is displayed in a separate webpage (see **Fig. 8**). The first table displays semester wise modules that has been prepared based on users' choices. The second box shows extracurricular courses that the users have been enrolled to. The last box displays a recommendation message from the tool as well as hyperlinks to some helpful webpages. These include the various career portals, job opportunities and internship pages from the partner universities of EuroPIM.

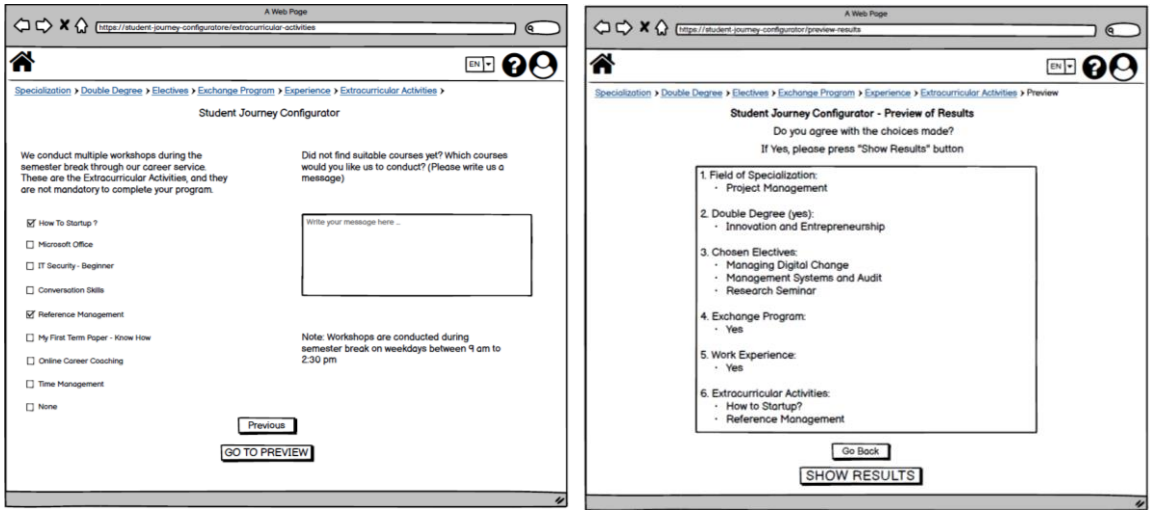

Fig. 7. Wireframe 7 (Extracurricular Activities Page) and Wireframe 8 (Preview Page)

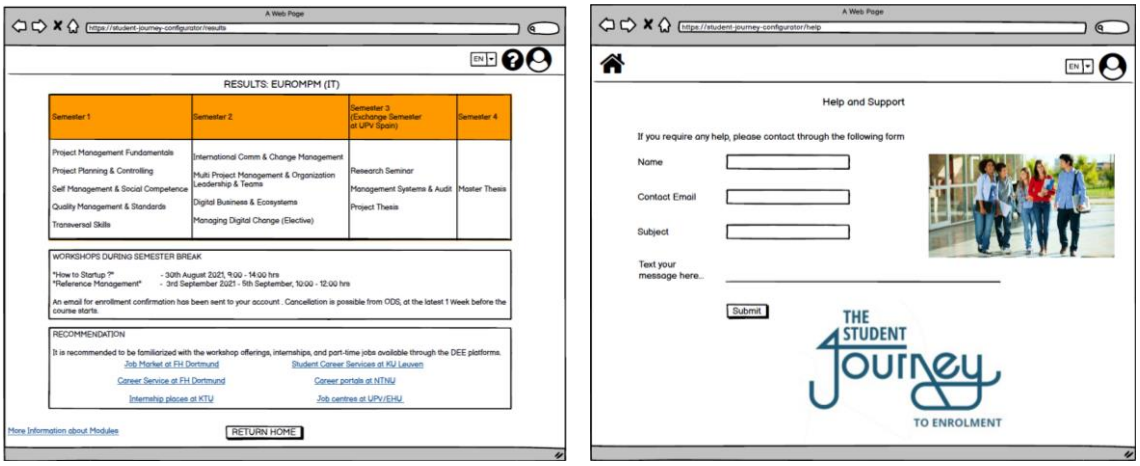

Fig. 8. Wireframe 9 (Configurator Results Page) and Wireframe 10 (Help Page)

The Help page (see **Fig. 8**) can be reached from all the pages. Users can write a message to the support teams from this page if they have any questions or require clarifications.

5. Testing

Usability testing is a key skill for usability practitioners whose main objective is to advise software developers to make their products more user-friendly [4]. Usability testing is one way to ensure that interactive applications are tailored to the users' needs and roles, with no negative consequences. The usability evaluation is a critical step towards an interactive system and its design process, whether it be a program, Web, IT, or service. The usability assessment aims to evaluate the efficiency and reliability of the system. (i.e., how well the system performs and how much time and effort needed to use the system functionalities) [5].

After creating the first version of the prototype, we performed usability tests on our developed prototype. The tests were performed by derived tester groups. The testing process was carried out on the conference platform of Zoom©. The link to the Balsamiq Cloud prototype was sent to the testers directly to avoid direct interaction from the developers. A quick overview of Wireframe was given to the tester during the conference call. The team had offered the following guidelines to reduce the potential for bias during the test: testers may think aloud, interact with the prototype, and inform team when they are through. In addition, we requested testers to share their screen. We recorded the first 3 tests with testers' consent. The aim was to observe their reactions, interactions with the prototype, areas of confusion and difficulties, areas that delight them most and document them. Finally, we collected feedback and suggestions from the testers.

We conducted testing in three phases, with 15 different users from various backgrounds and regions. In Phase 1, we tested with 3 users. After receiving their feedback and suggestions, we made some minor changes to our prototype. In Phase 2, we tested our prototype with 9 different users and made significant changes based on their feedback. Finally, we tested our modified prototype with 3 users, and it proved to be more user-centric and easy to use.

5.1 Summary of Test Results

The overall issues the testers faced in each webpage are summarized in this section. These are as follows:

Most testers pointed out that "Save" button was confusing, and the main point was not understandable in the first prototype. In addition, some testers suggested replacing the button with "Back and Next" buttons so that easy navigation could be found across all web pages.

The "Course Overview" button featured in the first prototype caused test-takers to become distracted. Furthermore, the main goal of it was not clear to them because it was meant to provide

some additional information as a reference for the list of subjects and courses available in the program. As a result, it was decided to include that information on a webpage about course selection as a hyperlink to the program modules handbook. In the final version of the prototype, the webpage with the course list was removed from the first “Home” page.
Some testers did not understand the questions about exchange semester. An additional hyperlink that redirects to the information page was introduced to increase clarity. A text box was also added to convey information about the program.
Some testers couldn't understand what the "Double Degree Program" meant. In this case, additional program information was added in the webpage. Apart from that, there was a problem with the options, which were displayed as buttons rather than checkboxes. Later, checkboxes were used to represent options in order to be consistent and coherent in terms of design.
One of the main issues during Testing Phase 1 was that some users were unable to reach the "Results" webpage due to the initial navigation structure, which caused confusion. As a result, the breadcrumbs hierarchy of webpages was introduced so that testers would not be confused by the Student Journey Configurator's step-by-step procedure. Apart from that, testers were unsure whether they had completed the procedure or not, which was a platform usability issue. In this regard, a webpage with a preview of the results was introduced with the option to edit the choices made. The resulting overview of the study program was presented in such a way as to indicate that it is the Student Journey Configurator's final page.

5.2 Recommended Changes

After Test Phase 1, we implemented minor changes in the prototype based on testers’ feedback. These include the following:

- We moved “Course overview” button on the top right corner (instead of top left corner)
- We moved “Start Student Journey Configurator” button from bottom of the screen to the middle of the screen
- We renamed button “Save” as “FINISH” in “Extracurricular Activities”

After Test Phase 2, we implemented major changes in the prototype, which are described as follows:

- Deleted “Course Overview” and “Elective” screens as well as nested screens
- Updated message in the “Home” screen to reflect Persuasive Design
- Added hyperlinks wherever necessary to redirect to information webpages.
- Renamed “Save” button to “Save & Next”, added new button “Previous”, renamed “Next” button in Configurator Output screen to “RETURN HOME”
- Made UI more user-friendly: added instructions where necessary, added additional questions, modified existing choices, etc.
- Added “Preview” screen with button for showing results
- Updated Table in Configurator Results, merged content of two output screens to one
- Rephrased questions in the some of the screens for clarity

After Test Phase 3, we documented the changes suggested by the testers, however these are not implemented yet. These include the following:

- Introduce Chatbot functionality to be able to ask questions
- Introduce a way to save the final results as pdf/excel/any other form of document

6. Comparison of Before and After: Iterative Prototyping

The elaboration of the versions of implemented prototype before and after are introduced according to the changes and alterations made based on testing feedbacks.

In particular, in first version of the “Home” page, during the Phase 1 of Testing, there was some confusion with the “Course Overview” button that created attention diversion (see **Fig. 9**). The purpose of it was not understandable by the testers. Another point is that the text conveying the main purpose of the Student Journey Configurator was not easily understandable by the testers. Lastly, the “Start” button was not in an intuitive place, due to which some testers couldn’t start configuring the studies for some time.
In the final version, as it can be seen from the top bar of the webpage, the icons of “Home” and “Help” buttons have been changed, thus it will be more intuitive for the testers (see **Fig. 9**). Moreover, Fogg [6] put forward the claim that behavioral characteristics and patterns of users can be predispositioned to the external persuasive factors that are responsive to particular aspects of behavior. In that regard, the introductory text of the Student Journey Configurator has been updated and modified in such a way to reflect the concept of Persuasive Design, thereby enabling differentiated aspects of user behavior. Finally, the “Start” button was placed in the middle of webpage with increased font size so the testers could easily start the configurator.

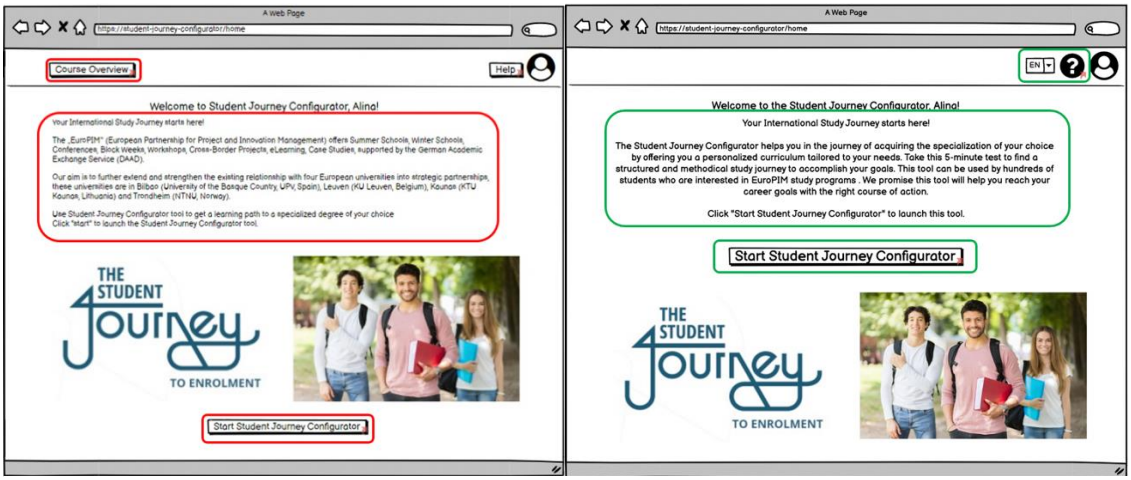

Fig. 9. Before and After versions of "Home" page

Another example is represented in “Double Degree” page (see **Fig. 10**). During Phase 1 of Testing, it has been found that majority of testers couldn’t understand the step-by-step procedure of the configurator and were jumping from one webpage to another. Another issue was with the options, as they were represented with buttons instead of checkboxes. Following that, some of the testers pointed out that the explanation of the “Double Degree” was not clear from the start. Finally, the “Save” button in the bottom part of the webpage was somehow confusing and the purpose of it was not so clear for testers.
In contrast, in the final version we have updated the icons of Home and Help buttons to maintain cohesion and consistency throughout all webpages (see **Fig. 10**). Secondly, we have introduced breadcrumbs hierarchy of webpages so that testers will not be confused with step-by-step procedure. Thirdly, we have updated the options with checkboxes and thereby integrated two questions in one page. Next, the “Save” button was updated with “Previous” and “Save & Next” buttons in order to introduce the intuitive navigation between webpages. Lastly, the cultural differences of users were addressed by introducing “Language” button in the top-right corner.

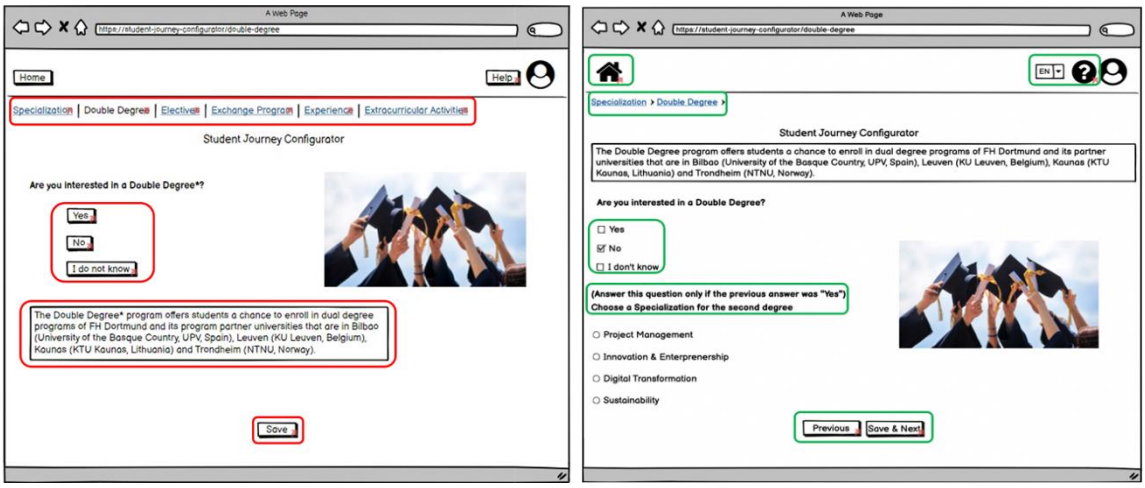

Fig. 10. Before and After versions of Double Degree Page

7. Conclusion

In summary, this research work has provided the characteristics and differentiated traits for the main types of users and their behavioral patterns using different tools and techniques such as Personas, User Stories and Use Case Diagram. Based on these derived definitions and concepts, a prototype of the Student Journey Configurator was developed. Further, in order to provide the iterative and continuous development of it, the research team has provided the usability tests with derived group of users (focus group). By conveying the concepts of Usability Engineering, there were provided in total 15 testing cases with diversified focus group comprising the 3 distinct phases: Phase 1 was contemplating 3 test cases and minor changes and updates have been made; Phase 2 consisted of 9 test cases and major changes were introduced into the prototype development; last Phase 3 was devoted to confirming and validating the usability features of final version of the prototype with 3 test cases. All the user feedbacks and suggestions were documented in the form of protocols and notes. The iterative prototyping approach for changes and improvements is taken as a backbone of the development.
In conclusion, we attempted to reflect the main pinpoints and underlying concepts of Usability Engineering while conducting and developing the prototype of the Student Journey Configurator platform.

8. References

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