A case of career consultancy in STEM for youths

Anna Mavroudi and Monica Divitini

Norwegian University of Science and Technology
{anna.mavroudi, divitini}@ntnu.no

Abstract. Career consultancy is an important but often downplayed aspect in technology-enhanced learning systems designed for youths although there is much learning in the career decision-making process. This case study focuses on identifying career consultancy services for STEM that can be useful and relevant to them. It involves participatory design for the school of the future in conjunction with workplace learning with a small group of adolescents. The paper provides an overview of existing online career consultancy services in STEM focusing on their unique characteristics, reports the findings of a group interview with participant STEM students about career consultancy, and presents future recommendations derived from the students themselves. The final student product involves a low-fidelity prototype of the envisioned career consultancy system. The case study can potentially inform practice on the topic of career consultancy in STEM education among youngsters

Keywords: Career consultancy, STEM, youth, technology-enhanced learning

1 Introduction

There is much learning associated with career orientation in terms of knowledge, skills and attitude. According to [1], knowledge might involve actions like retrieval of occupational information and self-appraisal; also, learning in the attitude level might involve beliefs associated to a career decision. The concern herein is how we can design technology enhanced learning systems that incorporate CC services for STEM targeted to high-school pupils. It involves three high school students (aged 15-16 years old) that live in Norway and a three-hour workshop on the topic.

2 Process and instruments

First, the facilitator conducted a semi-structured group interview about the topic of CC for STEM with the participant students. The dimensions of the interview were: 1) students' choices about career paths and existing CC services, 2) kind and type of information needed, and 3) CC events taking place in their (school) environment. The purpose of the interview was to understand students' practices and prior experiences about CC in STEM. Next, the workshop facilitator demonstrated twelve existing online services on CC about STEM. In doing that, she placed special focus on a few functional characteristics for each of the twelve services. Table 1 presents details about these.

Table 1. Existing online career consultancy services for students

Short description and URL of the online service	**Special characteristic/ functionality that helps students to….**
This is a website about women in STEM jobs, https://goo.gl/20qRpO	Reflect by presenting professionals sharing careers perspectives
Information about live events, such as a summer camp on Careers in STEM through Interactive Workshops and Game-Based Learning, https://goo.gl/o6Oy1b	Receive information by notifying them automatically about such events and discuss their perceived usefulness.
This website provides a simulation or game that lets you explore STEM careers, http://ionfuture.org/ in a playful way.	Receive basic information about each STEM career profile, organized in four sections Each career profile is associated with a game.
This website provides a STEM career glossary and informative videos, http://stemstudy.com/stem-careers-glossary/	With terminology and accessibility: STEM CC Glossary and mobile –friendly version (mobile app)
The Reality Check Tool will tell whether you can achieve your desired lifestyle based on your career of interest, http://www.careerwise.mnscu.edu/careers/realitytool.html	Determine whether their career goals are realistic using an interactive resource.
This webpage references other industry websites in the area, http://www.careerwise.mnscu.edu/jobs/industry.html	Explore the job market by providing connections to relevant industry websites in their region.
This webpage has self-assessment quizzes for the students, http://www.careerwise.mnscu.edu/careers/assessmentsuite.html	Self-assess and reflect on relevant or interesting career paths in STEM using quizzes
It enables selecting types of Open Educational Resources (OER) using various selection criteria, http://www.discovere.org/our-activities	Access a portal that contains relevant OERs; in our case, to the online repository that will contain STEM educational material.
Live chat between students and experts or counsellors, https://goo.gl/At4kEi	Live chat with experts or counsellors on career orientation
Request information via an online form, https://goo.gl/LnGurq	Complete a request online in order to receive informative material.
Email career consultancy questions or ask a counselor, https://goo.gl/J4M6OY and https://goo.gl/Xdcny7	Submit their questions to experts or counsellors on career orientation via an online form.

Perceived usefulness is critical for technology adoption [3]. The questionnaire also included an open-ended question where students could write any additional critical feature that they considered important. This process lead to requirements' prioritisation by the students for the envisioned system. The final phase of the workshop included two

main design activities concerning the envisioned CC system for STEM. The first activity followed a scenario-based requirements elicitation process of the system [2]. Having seen, explored, rated (and suggested) characteristics of the various STEM CC online systems, students described a scenario of use concerning a STEM CC system of ideal for them characteristics and functionality. The scenario-based approach was the basis for co-operative design. Before the beginning of the activity, in order to familiarize students with the paradigms of scenarios of use and the persona concept, the facilitator provided a written example. In addition, she explained the basics about paper prototyping and showed some examples. Next, the students created the scenarios and the low-fidelity prototype taking into account the requirements prioritisation that took place in the previous phase. That is, the prototype had to be in line with the requirements mentioned in the previous phase and the scenarios of use that the students had already created. The students worked together towards the creation of a mock-up user interface (UI) of the envisioned CC for STEM system. The facilitator created the digital version of the mock-up UI replicating the students' sketches while using a dedicated software.

3 Results

The group interview: the students had already chosen a career orientation. They think that students in Norway select what they want to study at the age of 15-16 years old. Regarding the kind of information that they need for CC purposes: a) companies active in their domains of interest and their profile, b) relevant positions and internships available in Norway and in Europe, c) salary information, d) (online) communities to get inspiration and feedback. To find such information, they used a website created by the Norwegian government, namely utdanning.no (https://utdanning.no/). There they find useful information, such as information about careers and main tasks, studies associated with a certain career path, and so on. One student was also using two other services specialised on his domain of interest (namely, gnist.no and elskolen.no). The students stressed the importance of finding updated information in such services. Regarding CC activities taking place in school, the students believe that counsellors can give useful advice; yet a few times, they gave bad (i.e. irrelevant) advice because they were not as well-informed as a professional/practitioner (e.g. an engineer). The students consult their parents, peers, teachers, and university students.

The student questionnaire: Table 2 presents the ratings on the perceived importance of the demonstrated functionalities. At the open-ended question, students answered that they would appreciate: postings with updated information coming from the industry sector about the profile of the people hired, and tracking the user activity in order to get an overview of the platform activity and possibly orientate themselves better.

The student scenarios: the scenarios of use created by the students were short and incomplete. Yet, they nicely incorporated the persona concept as well as the functional characteristics discussed, including their relative usefulness.

The prototype: it was in line with the requirements prioritization that took place in the first phase of the workshop and with the scenarios of use. Figure 1 shows the main (low fidelity) UI mockup of the students' proposed system.

Table 2. Perceived importance of the system characteristics

Characteristic/functionality	Importance (mean, st. dev.)
General information about the career path	M=5, S.D.=0
Online discussion forum	M=4.7, S.D.=0.6
Video interviews with the experts	M=4.7, S.D.=0.6
Connection to relevant industry websites	M=4.3, S.D.=0.6
Information about live events in your area	M=4, S.D.=0
Connection to relevant OERs in an organised way	M=3.7, S.D.=0.6
Glossary of relevant terms	M=3.7, S.D.=0.6
Live chat with experts or counsellors	M=3.7, S.D.=0.6
Self-assessments for students	M=2.7, S.D.=1.5
Email questions on career consultancy	M=2, S.D.=1
Request information about a career path via an online form	M=1.7, S.D=0.6

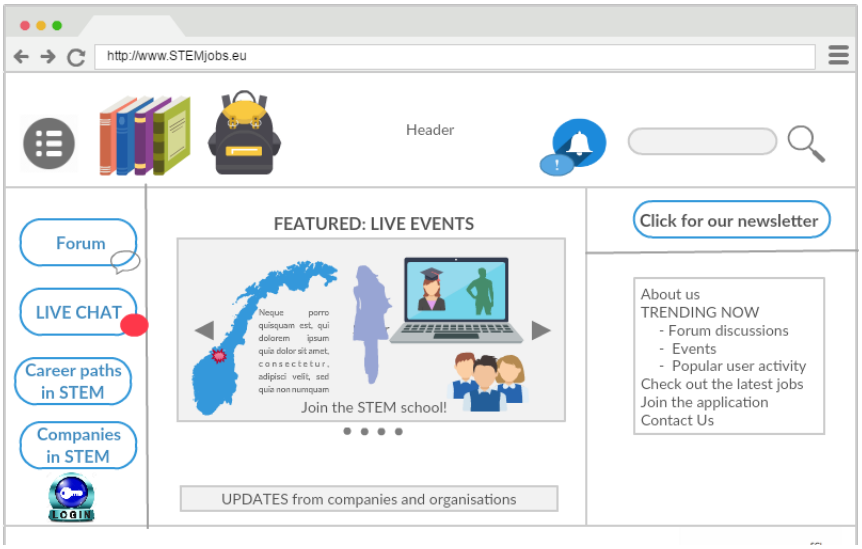

Fig. 1. The students' prototype of the envisioned system

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References

1. Cantrell, P., Ewing-Taylor, J.: Exploring STEM career options through collaborative high school seminars. Journal of Engineering Education, 98(3), 295-303 (2009).
2. Carroll, J. M., Rosson, M. B., Chin, G., Koenemann, J.: Requirements development in scenario-based design.Software Engineering, IEEE Transactions on, 24(12), 1156-1170 (1998).
3. Davis, F., Bagozzi, R. Warshaw, R.: User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. Management Science, 35, 982-1003 (1989).