Course report Faculty of Technology and Society

This course report is based on student feedback and submitted course evaluations, exam results and the teacher's idea for further development. The course report is published on the course website and Canvas-site.

Course name	Emerging Digital Technologies
Course code	DA621E
Semester	Ht22
Number of registered students	9
Course coordinator	Dipak Surie

X	Course report is published on Canvas-site
	Course report is published on course webpage

Compulsory course evaluation

Number of responses to the compulsory course evaluation	8

The compulsory course evaluation has been conducted through:

	Standard template via SSR (Sunet Survey and Report)
	Extended standard template with *own questions* via SSR
X	Own evaluation method by the course coordinator

If own evaluation method was conducted, describe how:

A questionnaire-based survey was conducted after the course DA621E ended. The survey was complemented with a class discussion where specific topics / points were taken-up for further discussions.

Additional evaluations that were conducted during the course

	Separate survey
X	Oral evaluation in class
	Oral evaluation in smaller groups
	Other evaluation method

If other evaluation method was conducted, describe how:

As mentioned above an oral evaluation was conducted in the form of class discussion.

Comments on the course evaluations

Write comments here

The questionnaire focused on several topics / themes:

- **Workload:** Since the course is a full-time one at the master's level, the expected workload is about 40 hours per week (+/-15%). Students get weekly lectures / workshops / seminars and other practical tasks that correspond to 40 hours per week. Majority of the students (6) have spent approximately 40 hours per week. 1 Student has spent just 20 hours per week while another student has spent 55-60 hours per week. The 2 extreme cases are interesting and further dialogue is needed to understand why lesser time or more time were invested in this course weekly. It would be interesting to know the students' result outcome in accordance with the hours spent per week, but that data is not available.

- **Orientation week (introduction to different emerging digital technologies):** 7 out of the 8 students felt that the orientation week was useful (or very useful). The other student did not answer the question. Students felt that the week helped them get to know about the different emerging technologies and how they were used to solve societal challenges. It has helped students get a clearer picture of what to expect from the pool of emerging digital technologies. It also provided a sketch of the course content and the scope of things to learn.

- **Poster session:** All the 8 students liked the poster session and felt that it was useful. Students felt like they could learn more about a specific technology through this session and how it could be used to apply to specific societal challenge. It was fun, engaging and motivated to do research. It was useful in building skills to do research. It was a new concept and thoroughly enjoyed it. Presenting articles as a poster is a good experience. A new communication format, helped learn a lot of things about how to communicate through poster and videos. One student reported that the session was stressful because of the time and suggested 1.5 hours for the poster session. The student felt hectic since it was in the university corridor and preferred to have it inside a classroom. As a teacher we would not recommend that since the idea is to disseminate student posters to as many people as possible and get their feedback, thoughts and comments. One student commented on the coordination aspect in terms of where the poster session was conducted. We as teachers will try to find a corridor space earlier (hopefully floor 5 in Niagara for next year). As suggested, maybe we can have the posters there for a few days or even for 1 working week.

- Lund University VR lab visit: All students enjoyed and appreciated the visit. Had a good experience, was interesting and informative. It was a marvelous experience. Very much enjoyed it, got insights into the current trends in VR, use case scenarios of VR like in the industry, army training, etc. Helped student play around with VR tools and environment that provided many ideas for future projects. It was useful and provided the perspectives to explore different application of mixed reality technologies. It was useful practical knowledge that helped in doing the assignments. One student recommends limiting the number of games played in VR and focus on VR experiences that aim to solve specific societal challenges. Another student questioned why Malmö University does not have such VR lab and recommended setting one at Malmö University. As teachers, we are constantly working towards setting-up good labs for our students, and we hope to pull-in the resources to set-up a good lab for VR purposes at Malmö University that can be accessed by TAICS students.

- Workshop / lab work: Overall the workshops were rated very good, engaging and informative. Having each week focusing on a particular digital technology gave students the room to experiment before jumping into building prototypes. It also gave the teams a chance to learn slowly the technologies that were relevant to their final project. The practical task of working with technologies like IOT and VR allowed the possibility to explore these technologies. It also helped working in teams, collaborate and work making use of the feedback. While all the workshops were appreciated, most of the comments targeted one workshop with Arduino where the APIs did not work due to technical issues. Student suggestions include upload a video of how Arduino works (tutorial video to do the preparation task). Students had some challenge with the IOT cloud integration. The Arduino representatives did communicate and answer emails. One student suggested to have the Arduino workshop once again on a different day when the technical issues were resolved. One student wanted more time to study and dive deeper in the concepts. The students felt that the workshops touched on the outer layer of the emerging digital technologies, but deeper in-depth technical support was required. A module focusing on how to build VR/AR using the tools in-depth would be useful.

- Technical support to build prototypes: Mixed response on the level of support obtained but overall, most students acknowledged the support provided by the teachers Benjamin Maus and Johan Holmberg, especially in the suggestions and instructions provided on how to proceed with the project prototype, and in their technical support. IOTAP lab and K3 lab facilities were appreciated. Students borrowed their equipment and appreciated the possibilities to program/test them outside the university campus (e.g. at home). There were suggestions on having the possibilities to save them in lockers at the university for better sharing among the students in a team. Some students expected better

technical support when it comes to coding and debugging. They felt lesser support was provided around the Christmas time and suggested if it is possible to get the support earlier (from the 2nd week of November). One student felt the need to update the scheduling to receive better technical support earlier. We as teachers will review the recommendation and try to provide the technical support at an earlier stage in this course.

- **Experience working in a team:** Overall the experience of working in a team was rated good. Students felts good to work in a team, 4-person team was good for the amount of workload, learned a lot since people have different diverse skills, increase confidence, learned to manage a team, learned to work in complex situations, etc. Some students felt challenging at times since everyone have their own way of doing things but figured out a way to work together and work according to individual strengths and as a team. Their skills were complemented quite well for completing the task successfully. A student felt that teamwork helped make use of different skills and ideas, work faster and more professionally in comparison to doing the task individually. A couple of students discussed the challenges with communication, especially the language barrier and the need to do more work in comparison to other team members. We as teachers recommend having a social contract and communicate with the teachers in case you as a student feel challenged.

- **Experience working on a project:** All student rated the project work as good one. It was good, exciting, best way of bringing together the emerging digital technologies learned each week. For example, AI and IOT was coupled and to see it as part of solution was interesting. Students enjoyed the blend of hands-on workshops with reflective written assignments. The project helped to search good articles, read them and work with people with diverse skills. It is good to have a project because the students tried to apply what was learnt during the classes and workshops without thinking about the results. Students felt that it is a preparation for the future where they would work in other projects or jobs like the project work on this course. A team have expressed their struggle initially to figure out a societal problem and appreciated the discussion with Dipak Surie to narrow down their ideas together. The team got better after the discussion and spent more time doing the project work. The project work also helped to deepen student knowledge, evaluate ideas to final product, and manage human resources. One student suggested that learning these technologies prior would have made it easier. As teachers, we try our best to introduce you to the technologies as early as possible in the course. In reference to the earlier comment on the similar topic (technical support when working with emerging digital technologies), we will try to provide technology support as early as possible.

- **Experience with the teachers:** Great teachers (with a like emoticon), super helpful! Flexible, helpful, good communication, incredibly supportive, quick

response times, guided us in a good way. A student felt the overall experience was good, especially with Dipak because he was always available to help us and most importantly uploaded his literature on time. Another student felt that Dipak and Benjamin were good, both helped us during our project every time we asked them, guided very well and could reach them easily. The teachers were readily available for guidance and coaching, clarifying requirements of assignment and pointing us to the right channels where further assistance was needed. The teachers were incredibly supportive & helpful. Whenever we felt stuck, we could always go to them to talk about things. Every feedback from them was useful. The teachers taught in a friendly way that made it easier to learn.

- **Literature & supporting materials**: All students rated the literature good. It was good, helped a lot, a good starting point, happy, interesting, nothing felt unnecessary, helped in doing the assignments, etc. Students liked the list of references at the end of assignment specifications and found it helpful. A student appreciated the book "Designing for emerging technologies edited by Jonathan Follett. One student felt it was not necessary to read entire books for this course. As teachers we recommend reading the entire book since it is not possible to cover them completely in class. Even if some chapters were less relevant (according to the student), it would help get a holistic picture and use the knowledge to handle future challenges in the subject. Another student felt the need to have more material for gaining knowledge to work with Arduino. The recommendation is to have specific workshops/classes to go in-depth with Arduino and it would help having better outcome. We take this recommendation seriously and will try to insert a specialized class on Arduino.

- **Learning outcomes:** 7 students felt they achieved their learning outcomes while one student felt 50%. Overall, the students have answered yes. The outcomes felt the course to be beneficial, learned a lot, learned about different emerging technologies, prototyping, and the course was at a very, very high-level.

- **How challenging was the course?** The course is rated to be very challenging and we as teachers strive to keep it that way to ensure that students explore, focus on higher-order thinking and gain practical experience.

- **How satisfied with the course?** 7 students were totally satisfied while 1 student is not completely satisfied. Most students felt fully satisfied, enjoyed it, totally satisfied, very much, etc. 1 student highlighted the need to provide better specialized knowledge support.

- **Things that students liked in this course:** flexible and helpful teachers, informative hands-on labs & workshops, guest lectures from industry experts,

visit by industry experts (e.g. Numena, Arduino, etc.) poster session, podcast, subject matter & content, VR workshop, Lund university visit, Arduino workshop, Working with Benjamin, Discussion with Dipak, team assignment, course structure (weekly exploration), peer reviews, TED talks, concept development, Wizard-of-oz, collaboration work, good guidelines, technical support, literature support and feedback.

- **Things that needs improvement in this course:** More activities/tasks so that one could interact with everyone in the class, reduce the task of reading articles and presenting them (we as teachers want students to read academic articles at master's level), all teacher should provide lectures and inform if they do not attend the class, take less classes-less assignments-reduce lecture timing (we as teachers will think about it but having less classes-less assignments can make the course shallow), fewer morning classes, Zoom sessions for short classes, more field work assignments, more field trips like visit the Lund VR lab, technical support availability, coordination of presenting the poster assignment, explore different boards on IOT week, bring resources who can teach technical stuff, time frame of technical support (2nd week of November), more labs related to IOT, Arduino and Raspberry Pi with materials and workshops to teach us, more practical work. One student felt the course was totally good.

Examination results

X	Examination results are as expected
	Examination results are not as expected

Overall, very good results especially when we have a diverse class with some students having limited background in emerging digital technologies / design / innovation. Some students were exceptional considering an active learning approach and a focus on higher-order thinking. Several creative and relevant examination formats including podcast, poster, reflective essay, research seminars, project work, labs and TED video discussions were applied in this

course. Most students responded well and developed their skills in varied examination formats. The practical part was also showcased through their project work with the development of sound concepts and taking the efforts to develop prototypes in emerging digital technologies like IOT, AI, etc. which are time-consuming. With in-house lab(s) at Malmö University and easily accessible technical support either from Malmö University or through industry resources from say Arduino would help our students.

Recommendations and priorities for the course development

All the points mentioned and discussed above will be considered for next year. Top priority include:
- Technical support on specific technologies (e.g. Arduino) will be provided early in the course.
- Try to set-up an in-house lab for our Master students to try, play and learn using emerging digital technologies.