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Agile methods to enhance iterations in designing solutions for active ageing

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Abstract

Agile methods to foster rapid creative iterations were introduced in the *squad* 'Studio Silver' at the Industrial Design department of the Eindhoven University of Technology. These methods are used in order to build understanding of the needs and social interaction of healthy and active ageing and design interventions for new behavioral patterns and increase quality of life. To nurture *Agile* iterations, we integrated a working approach for the students, consisting of trial-reflection-iteration and feedback loops. Throughout the implementation of the *squad* (i.e. a studio approach of approximately 30 students for collaborative communities in which students work in design and research projects)*,* students present their progress in terms of short write-up of the design proposals, presentations, and prototypes several times in a period of 16 weeks. Formative feedback serves as feed-forward method to stimulate new actions in the design allowing spacing effect in rapid prototyping and supporting long-term learning. We conducted a study in semester 2, 2019, to investigate the effects of feedback and reflection on students' deliverables. Two interim feedback moments were introduced. First one tool place in week 4 for students to present design/research proposal to demonstrate why there is a design/research challenge, how they plan to tackle it, what they expect to achieve and what they have already achieved. In week 8, students submitted a reflection that summarized the feedback, which they have received in the rubrics regarding the integration of competence areas, design research process, and demonstrators, and presented their reflection on their understanding of the feedback received. In addition, students' perceptions on coaches' feedback style was collected to learn whether coaches' attitudes stimulate reflections and iterations. Results of interim feedback moments from the selected deliverables of 10 students indicated that most of the students made improvements in their design and research processes showing that this Agile method on feedback-reflection loop stimulates iterations. Regarding students' perceptions on feedback and coaching style, this helps students reflect, understand better and adjust the design scope/research challenge of the project.

1. Background

Studio Silver is a *squad* aiming at educating future industrial designers to develop societal solutions for healthy and active ageing in the Department of Industrial Design at the Eindhoven University of Technology, the Netherlands. Next to the required design competencies, students are required to develop a high-level empathic research capacity towards the target user groups in addition to related knowledge, skills and attitude to work with complex stakeholder network involved. The instructional set-up of *Studio Silver* is based on the studio approach stimulating the design in context with and for the target user groups. The asset of this set-up is that it trains students not just by design researchers but also by design practitioners and experts from the field. In order to stimulate students to reflect upon results and run a new iteration in the design and research process we included several feedback moments along the project process.

2. Purpose/Hypothesis

The purpose of this study was to investigate to what extent does the approach trial-reflection-iteration and feedback loops support students to make progress in their design and design research projects towards the end deliverables. In addition, we also were interested to study students' perceptions on coaches' feedback towards fostering iterations in the design process. The feedback-reflection approach we applied for this study is adapted from Gibbs[1] model consisting of several loops of feedback upon which students reflect. To apply this model, we integrated two interim feedback during coaching moments and applied feedback methods[2,3] from research in different periods of the squad project life, i.e. weeks 4 and 8.

3. Design/Method

The research method consisted of a qualitative analysis of students' mid-term deliverables in two different moments of the semester (i.e. week 4 and week 8). We compared these deliverables, i.e. design and research proposals, in order to find out whether there have been improvements in the follow up design iterations compared to the first iterations of design and research proposals. In addition, we collected students' perceptions on teachers' feedback to understand whether this type of feedback influenced students to adjust the working approach. The analysis of the deliverables comprised a limited number of students (N=10) from the total group of *23*. Some of the deliverables, i.e. design and research proposals, were a product of 4 students working in a group, and those also handed in one form together. Other forms were from the individual students. A rubric was used to assess students' progress focusing primarily on the design research process. To collect students' perceptions, we designed a 5- Likert scale structured questionnaire validated by empirical research studies[4]. All students enrolled in the *squad* 'Studio Silver' (N=23) participated in this survey.

4. Results

Results indicate that 5 out of 10 students did not have a clear and specific design research process at the beginning (week 4), while 4 of these 5 had in the second iteration (week 8) a clearer plan and process defined showing that students were on track according to the coaches' expectations on progress and quality of deliverables. Furthermore, 1 of the 5 students was still uncertain, although the student was aware about the clear activities to conduct in order to adjust the work and continue with the process. Regarding the results of the structure questionnaire, students' perceptions are positive regarding the influence of the feedback to help students reflect, understand better and adjust the design scope/research challenge of the project. Table 1 summarizes the results of the qualitative study, i.e. first and second deliverable. In addition, students reveal that the feedback supported them to create iterations and to develop a prototype of an interactive system. This is because that feedback focused also on encouraging students to explore other design alternatives and additional activities.

Table 1. Differences in students' 1st and 2nd deliverables

Students	First deliverable	Second deliverable
Student 1	defined design research process as inductive research, qualitative data analysis is desired.	need to communicate better what the inductive research process is and the also consequently carry that out
Student 2	iterative design process, literature, persuasive principles, user research	already made low-fi prototype, first user feedback provides insights to re-iterate
Student 3	really general, need to be more specific	already have a concept, now it is clear that two other iterations are needed
Student 4	really general, need to be more specific	came to the focus on stimulating conversation between residents of a dementia centre. There is a plan to develop this via a number of user tests using different stimulus (images and questions)
Student 5	already have a clear view on what she wants to do, already concepts, clear plan	already have a working prototype, explored different materials, now the focus is on interaction and trigger interaction.
Student 6	follow design for one process, already planned out	clearly worked out process, focus on data analysis, design in progress
Student 7	have a general process to start with	student was kind of confused and did not know what to move forward after the first expiration and ideation, switch is made to do a design research project and focus on researching one interaction quality
Student 8	have a general process to start with	there is a concrete plan now to make the design context more specific. Yet the student still needs to take actions to make it clear and specific, but the awareness is there
Student 9	did not have a clear plan, need to be more focused and specific	already done a lot of user exploration, good insight and first concept, now have a detailed plan to move forward
Student 10	have a very clear design research process defined	really on track, clear view of the process, and detailed activities planned out

5. Conclusions

We conclude that the iterative and reflective coaching process has helped students make good progress towards mastering a mature design research process. Moreover, students' perceptions on coaches attitudes and coaching style confirm the theories on stimulating learning through iterations in design processes. Therefore, the introduction of Agile methods supports the education of future engineers and nurture the necessary competencies in the design research process enabling design solutions for healthy and active ageing. The nature of the Agile approach brings in interesting insights on promoting students quick transformations on preliminary designs and research proposals, supported by sound reflection in action.

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