Teaching two course instances of online teaching – what changed from 2020 to the "new normal"?

Per Warfvinge and Torgny Roxå,
Centre for Engineering Education, Faculty of Engineering, Lund University.

Abstract— **Data from LTH's course evaluation survey CEQ suggest that the rapid transition from campus to online teaching in the spring of 2020 made the teaching less prone to support a deep approach to learning. Here we show that in the spring of 2021, survey items related to Good Teaching and Clear Goals and Standards recovered to pre-Covid levels. Teachers give examples of many small adjustments that, together, may explain the improvement. More feedback to the students and better use of online tools (e.g., for lectures and group work) may be key factors. We suggest that teachers have made efficient use of information from examinations, teaching and learning activities, student comments and colleagues and that they have a low threshold to start reflecting on ways to improve their teaching, and as a whole. Consistently, the teachers have given priority to changes that support a deep approach to learning among the students.**

Index Terms— **Covid, CEQ, deep approach to learning**

I. INTRODUCTION

IN March 2020, Covid-19 forced Swedish universities to transform the teaching overnight from campus to online instruction. As of 2021, the literature is overflowing with studies related to this transition. Issues that are addressed include social effects on students being detached from the campus environment, readiness for change, effects on learning and grades, innovative instructional methods, effects on student motivation, general positive and negative effects, impact on the digitalization of higher education etcetera.

With respect to the Swedish context, a meta study by the Swedish National Union [1] of student experience data from ten Swedish universities showed that a vast majority of the students experiences lower teaching quality when the courses went online. They also worried more about their studies.

At the Faculty of Engineering at Lund University, LTH, the rapid transition to online teaching – sometimes referred to as emergency remote teaching [2] – coincided with a mid-term break devoted to exams. Hence, the teachers were only given a few days to plan their teaching for the new situation.

In order to capture the effect of transition on the students' experience Warfvinge *et al.* [3] analyzed data from LTH's course evaluations, comparing data for the study period 4 (March to late May) 2020 with the reference period 2017-2019. The main conclusions were that during the pandemic:

- The students expressed less overall satisfaction with their courses in 2020.
- The students received less feedback and fewer valuable comments and were less motivated by the teaching.

- It was harder for the students to understand the expectations, including the standards of work.
- The assessment had a tendency to focus more on in-depth understanding than before.
- The students were given more time for understanding, but maybe the workload was experienced as heavier.
- The students became better at planning their work and to write, while teamwork skills development suffered.

The analysis also showed that male students expressed less favourable – or more negative – views of the changes from 2017–2019 to 2020 as compared to female students.

The purpose of this study is to follow up on the previous analysis of course experience data from 2020 and the reference period 2017–2019. Besides using course evaluation data, we include examples of changes in teaching practices provided by teachers that acted as course coordinators in study period 4 in 2020 as well as in 2021.

II. THE CEQ DATA

The summative course evaluation survey used since 2003 at LTH is called the Course Experience Questionnaire, CEQ. Developed in the early 1990's [4] it contains 26 items. Out of these, 18 items capture weather the teaching promotes a deep approach to learning. A deep approach to learning is understood as when the students focus on ideas, relations and meaning of the subject content, as opposed to just memorizing unrelated facts. The 18 items are groups into four scales: Good Teaching (6 items), Clear Goals and Standards (4 items), Appropriate Assessment (4 items), Appropriate Workload (4 items). An additional category deals with General Skills development (6 items). Finally, two items, Overall Satisfaction and Relevance for My Education are stand-alone and hence not part of a scale. The students answer on a five-level Likert scale and the results are coded to span from -100 (fully disagree) to +100 (fully agree). The CEQ is described in full on https://www.ceq.lth.se/info/dokument/.

The CEQ is distributed around the end of the course, in this case late May to early June. Courses that span over either half, or the full semester are evaluated at the end of the semester and included in the data set. We base our analysis on circa 3500 surveys each year with a total of over 80000 scores. The gender distribution was 40% female and 50% male, will close to 10% did not indicate gender when filling out the survey.

The data sets for 2020 and 2021 covered 262 unique courses. Out of these 190 courses (72%) were surveyed both years, while the remaining courses were unique for one of the years. There are many reasons for this (e.g., varying course

sizes, changed course codes, courses given periodically) but we do not believe this to obscure the general picture.

III. STATISTICAL ANALYSIS – RESULTS

Figure 1 shows the changes in all 26 CEQ items from pre-Covid to 2020 (circles) and 2021 (filled squares) respectively. The item Overall Satisfaction as well as *all* items related to Good Teaching, Clear Goals and Standards and Appropriate Assessment improved (i.e., the filled squares fall to the right of the large circles). On the contrary, *all* items related to Approved Workload got worse scores in 2021 than in 2020.

Six CEQ items improved significantly ($p<0.05$, Wilcoxon rank sum test), and one got significantly worse. The items are:

- During the course I have received many valuable comments on my achievements; The teaching staff normally gave me helpful feedback on the progress of my work. (Good Teaching scale, improvement)
- I usually had a clear idea of where I was going and what was expected of me in this course; It was often hard to discover what was expected of me in this course (reversed question); The teachers made it clear right from the start what they expected from the students. (Clear Goals and Standards scale, improvement)
- The assessment methods employed in this course required an in-depth understanding of the course content. (Appropriate Assessment scale, improvement)
- I was generally given enough time to understand the things I had to learn. (Appropriate Workload, worsening)
- The course helped me develop my ability to work in a group. (General skills, improvement)

Regarding the scales used to capture how the teaching, and the students' situation, supports a deep approach to learning we see significant changes ($p<0.05$) from 2020 to 2021. As shown Figure 2, the three scales that most directly reflect the teachers' efforts, Good Teaching, Clear Goals and Standards
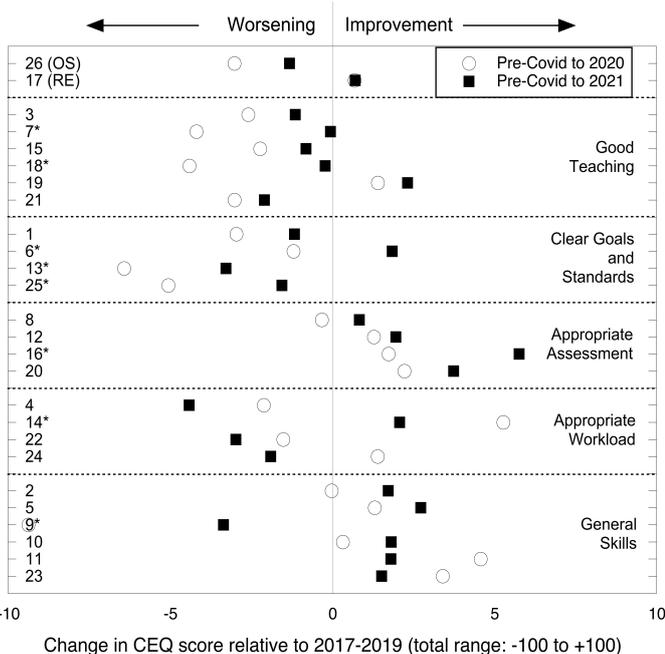

Figure 1: Changes in CEQ-scores for the 26 items of the survey, relative to the scores during the reference period 2017–2019, based on about 3500 surveys each year. Note the "hidden" 2020 data point for item 9. For a full description of the items see https://www.ceq.lth.se/info/dokument/.
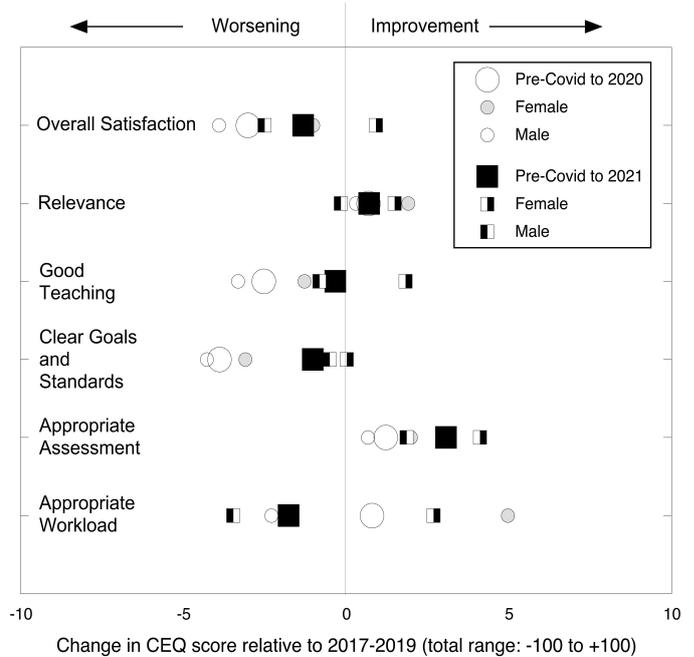

Figure 2: Changes in two CEQ items and the four scales, relative to the scores during the reference period 2017–2019. The means are also separated with respect to female (40%) and male (50%) students. For a full description of the scales see https://www.ceq.lth.se/info/dokument/.

and Appropriate Assessment, improved while Appropriate Workload suffered. The statistical analysis show that in 2021, Good Teaching and Clear Goals and Standards could not be separated from pre-Covid scores, while Appropriate Assessment scored significantly better and Appropriate Workload significantly worse relative to the pre-Covid data.

Figure 2 also show the scales separated into how female and male students, as groups, responded on the two stand-alone items and the four scales. The data representing male students fall to the left of the data for the female students. Across all data showed in Figure 2, the male students have thus consistently responded less favourable to the transition from campus to online teaching than the female students.

IV. TEACHERS' VOICES

To give "flesh and blood" to the statistics, we arranged two focus group discussions with six experienced teachers where they gave examples of changes made from 2020 to 2021, without being instructed to use CEQ as a backdrop.

Examples of changes made from 2020 to 2021 clearly related to the scale Good Teaching include:

Rather than replacing lectures with pre-recorded videos, we held live lectures in Zoom that we recorded and published on Canvas.

We introduced automatic check of assignments which allowed us to free up time for the TAs, time that was used to give more individualized support to the students.

We changed the format of exercises from having one room in Zoom for all students to many breakout rooms that the students choose, which improved attendance.

We introduced sessions when students could consult the TAs about the labs.

Examples clearly related to the scale Clear Goals and Standards include:

We changed project work supervision from one group at a time to a few groups at a time, which gave the students richer information and more understanding of the whole.

We revised all the written instructions for all compulsory assignments and projects to make them clearer.

We made short videos that introduced the assignments in order to better communicate purpose and demands.

Examples clearly related to the scale Appropriate Assessment include:

We changed the format of the final on-line exam by adjusting the level of difficulty and fine-tune settings in Canvas to make the assessment more accurate and fair.

Rather than just correcting lab reports (right/wrong) we introduced group seminars were the students could discuss the lab and the lab reports (show-and-tell).

V. DISCUSSION AND CONCLUSIONS

The statistical analysis paints a picture of teachers that have made efforts – and succeeded – to improve their interactions with the students. The most striking change on the Good Teaching scale is that the feedback and individual comments to the students have improved relative to 2020 and are back at pre-Covid levels. The teachers provided several examples of such adjustments that involved rich interactions with teachers, TAs and peers either individually or in small groups. In some cases, these interactions were formative in character, in others part of formal examinations. The Good Teaching Scale also addresses the teacher's ability to explain. Several teachers said that they changed from providing "lectures" as pre-recorded videos to giving live lectures in Zoom, with an active chat. If that was a common pattern, it would partly explain the improvement in CEQ items related to teachers' ability to explain as well as to motivate students.

Teachers have also been able to communicate goals and standards better. Possibly this was because there was a genuine uncertainty in 2020 about what one could expect from the students when assignments, projects and laboratory work etcetera had to be carried out in new formats, and how instructions were best designed to fit the online format. The examples given by the teachers point to several instrumental actions to clarify goals, while the increased feedback experienced in 2021 may also have helped students to understand the expectations and standards.

Historically the scale Appropriate Assessment has scored much better than the other scales. This difference was augmented slightly in 2020, but took a significant leap in 2021, as partly new and exclusively online examination methods were introduced. CEQ clearly suggests that the digital home format has driven examination towards methods that promote a deep approach to learning among the students. The teachers also gave several examples of how the digital examinations had been fine-tuned between 2020 and 2021.

The teachers expressed that it took time for teachers and students to learn how to use the key digital tools Zoom and Canvas effectively. Zoom also developed step-by-step from 2020 to 2021, for example with respect to the breakout rooms. This is most clearly reflected in the improvement in CEQ item 9: The course developed my ability to work in a group. After a huge drop in 2020, it improved drastically from 2020 to 2021 which is in line with examples given by the teachers.

From 2020 and 2021 the scale Appropriate Workload dropped dramatically. This is surprising since better teaching and clearer goals and standards should ideally provide a more "smooth ride" for the students. One could speculate that the students' more negative experience of the workload is related to their motivation and ability to experience meaning within an increasingly confined social context, but this is a complex issue that requires – and deserves – more research.

The gender differences are clear: male students are more negative (or less positive) to the shift from campus to online teaching than female students. This said, both genders experience similar improvement from 2020 to 2021.

The teachers made the changes in their teaching based on information gathered from several sources: observations of their own teaching, exam results, discussion with colleagues and TAs as well as input from students. One teacher said that the development work done from 2020 and 2021 was no different than the normal practice. It was more the magnitude of the sheer work and the multitude of the new aspects to consider that were different relative to a "normal" year.

Teachers also stressed the importance of accountability, as several – pedagogically very well justified – changes were made primarily to secure accurate and fair examination that lived up to both the syllabus and the teachers' own standards.

To conclude, the authors are impressed with how the teachers managed to develop their practice during the pandemic. The threshold for teachers to start to reflect on, and to adjust their teaching was clearly very low. The examples of adjustments provided by the teachers almost exclusively suggest that when faced with a pedagogical challenge, they choose a solution that supports a deep approach to learning. If the teachers interviewed are representative for LTH, the positive development captured by CEQ makes perfect sense.

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