Association for Information Systems

AIS Electronic Library (AISeL)

Proceedings of the 2020 AIS SIGED International Conference on Information Systems Education and Research

SIGED: IAIM Conference

12-21-2020

DELIVERY AND ASSESSMENT OF A SYSTEMS ANALYSIS COURSE DURING COVID-19

Suryani Lim
School of Engineering, IT and Physical Sciences Federation University, suryani.lim@federation.edu.au

Jo-ann Larkins
jo-ann.larkins@federation.edu.au

Follow this and additional works at: https://aisel.aisnet.org/siged2020

Recommended Citation

Lim, Suryani and Larkins, Jo-ann, "DELIVERY AND ASSESSMENT OF A SYSTEMS ANALYSIS COURSE DURING COVID-19" (2020). *Proceedings of the 2020 AIS SIGED International Conference on Information Systems Education and Research*. 25.
https://aisel.aisnet.org/siged2020/25

This material is brought to you by the SIGED: IAIM Conference at AIS Electronic Library (AISeL). It has been accepted for inclusion in Proceedings of the 2020 AIS SIGED International Conference on Information Systems Education and Research by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

DELIVERY AND ASSESSMENT OF A SYSTEMS ANALYSIS COURSE DURING COVID-19

School of Engineering, IT and Physical Sciences
Federation University
suryani.lim@federation.edu.au

Jo-ann Larkins
jo-ann.larkins@federation.edu.au

Abstract:

In this paper, we review and reflect on our experience in the teaching of a Systems Analysis (SA) course in Semester 1, 2020, in Victoria, Australia, during COVID-19 lockdown. The SA course is a second-year course for all Bachelor of IT programs in our university, and it ran on three campuses and online. Students work in groups of three to analyse and document the system requirements of Australia Post.

This paper describes the design of an SA course, how all students moved to online mode and the design of the final assessment to replace the traditional face-to-face exam in response to COVID-19 lockdown. We also describe the content of the course, method of instruction, assessment tools, the learning outcomes during online, what we have learned from running this course, recommendations for future offerings and how others can adapt and apply the practice.

Keywords: Systems analysis, constructivism, accountability, teamwork, COVID-19.

I. INTRODUCTION

COVID-19 has disrupted the delivery of education: face-to-face teaching and assessments were not possible. Our Systems Analysis (SA) course was originally designed for both face-to-face and fully online teaching. For the first four weeks, the course was delivered both face-to-face and online, but in the fifth week, all students moved to the online mode.

Teaching a Systems Analysis (SA) course is challenging for various reasons. For learners to appreciate the need for an analysis phase requires students to appreciate the scope of challenges faced by IT professionals when developing a complex information system: unclear or non-existent requirement specifications, gathering and documenting of information, communication and other constraints (technical, financial, etc). The skills taught in a typical SA course are required for in-demand IT professions such as analyst programmer, business systems analyst, end-user analyst, etc [Victorian Skills Gateway, 2107; Australian Computer Society, 2018].

The SA course at our university is a second-year, first-semester course for all Bachelor of IT programs. The structure of this course had been a two-hour lecture followed by a two-hour tutorial and assessments based on a hypothetical case study. To better engage students to appreciate the challenges faced by analysts in the real world, we redeveloped our SA course, offering it for the first time in Semester 2018. In Section II of this paper, we describe the design of our SA course and in Section III we describe the changes made in response to COVID-19 and why these choices were made. Section IV reflects on our experience of the changes and the impact on students' final results. In Section V, we conclude the paper and provide some recommendations for moving to online delivery.

II. THE DESIGN AND DELIVERY OF SA COURSE

We redesigned our SA course in 2018 to deal with two common issues in a typical SA course:

- delivery of materials [Cybulski and Linden, 2000; Suscheck and Huff, 2007; Tanner and Scott, 2015; Wells & Jones, 2005]; and
- choice of case studies [Chen, 2006; Fatima & Abdullah, 2013; Tepper, 2014; Yousif & Naghedolfeizi, 2007]

Published innovations in the delivery of SA courses typically focus on either the material delivery or case studies, not both. Regardless of the focus of the redesign, all attempts seemed to have some positive impacts on students' learning experience but only two [Tepper, 2014; Tanner and Scott, 2015] showed an improvement in grades. It is also interesting to note Tepper focused on the case study but Tanner and Scott focused on the material delivery. In our redesign, we sought to revamp both the course materials and choice of case studies.

Class delivery sessions were reimagined as workshops, incorporating a combination of mini-lectures, individual work tasks, group discussions and class discussion. Individual work might include looking up examples relevant to the topics being discussed or answering online quizzes. Groups discuss the answers to the online quizzes or a given model, and class discussions consolidated the learning with reports from individual groups shared with the class.

The choice of case studies for analysis is pivotal in an SA course. Typically, assessments are based on hypothetical case studies, but research shows that adult learners are more engaged in working with authentic case studies [Gackowski, 2003]. Proponents of authentic assessment argue that students should be assessed by performing real-world tasks that demonstrate meaningful application of essential discipline knowledge and skills [Gulikers et al., 2004]. Some SA courses use authentic case studies with real clients; however, this approach is difficult to institutionalise [Chen, 2006]. We address this issue by having students analyse an authentic existing system, such as Australia Post. By using a system which is complex yet familiar to students we hope that students' prior knowledge of the system will help them in completing the assessment tasks. To compensate for the added complexity of working with real systems, we allocate time for students to work on their assignments during the tutorial and workshop with the support of their teacher, and provide formative feedback.

Many approaches require students to work in groups. Chen [2006] reported the difficulty of assessing the contribution of individual students working within groups, as good students tended to contribute more and "bad" students benefited from others' work - a common issue in any group assignments. Chen mitigated this by having students evaluate each member's contribution and the evaluation contributed to the final grades. However, peer assessment of group contribution can be unreliable as it required students to recall the contributions of each member. Fatima and Abdullah [2013] found that grading of group work was difficult because discussions were dominated by the confident members within each team – presumably active participation in discussions was a major contribution to the final marks. We resolve this issue by assigning more weighting to individual tasks and fewer marks to group tasks.

Another issue with group work is the lack of progress of or poor work of one student affecting the final grades other students. We minimised this impact by designing the assignment as a jigsaw task, where each student works independently on a portion of the task and individual student contributions are fitted together to complete the project much like a jigsaw [Aronson, 1978]. Each student can progress independently of other team members by having each student chose a subsystem to work with. To minimise the impact of poor students on good students the grading on group work focuses on how well they synthesise their work. In Assignment 1, for example, students had to consolidate the domain model class diagrams produced by their team members into a single diagram. We awarded group marks based on how well the individual work was consolidated, not on the quality of the work before consolidation. The tasks for each assignment are described in Table 1 on the next page. In short, each student completed ten use case descriptions, a use case diagram for the ten use cases and a domain model diagram for their subsystem. Students then work as a group to consolidate the models of their subsystems and submit one group report. For the group work, marks are awarded based on the overall presentation of the report and how well the models from each subsystem are consolidated: whether the consolidated domain model class diagram includes all classes, relationships and attributes, and whether it resolves all conflicts from each subsystem (such as differences in class names, attributes and relationships).

III. COVID-19: MOVING TO ONLINE DELIVERY AND MODIFICATION TO FINAL ASSESSMENT

Four weeks into the semester, Victoria went into lockdown forcing all students to move online. As the course was already delivered fully online, this transition required no change to the materials. Workshops were still run as a series of mini-lectures with online quizzes, but we changed the mode of delivery from face-to-face to MS Teams. It was more difficult to run group discussions but class discussions were still possible as students sent texts to class messages.

Table 1: The tasks for Assignment 1 and 2 with individual and group components.

Assignment 1	Assignment 2
Submit a single report that contains the following: Individual component (70%) 1. Ten use case descriptions for the subsystem they work with. 2. A use case diagram for their use cases and there must be at least one <<include>> extension. If such an extension is not possible, an example of how this could be used and an explanation of the extension is needed. 3. A domain model class. Group component (30%) 1. A report that consists of the work of all individual's work. 2. A consolidated domain model class diagram.	Submit a single report that contains the following: Individual component (95%) 1. Develop two of the most complex use cases developed in Assignment one into extended use cases. 2. Develop the activity diagrams and system sequence diagrams for the two extended use cases. One activity diagram must have at least one decision-making, parallelism or loop. One system sequence diagram must have at least one of the following: a loop, optional or alternate frames. 3. Develop a screen prototype using Invision for one of the use cases selected in task 2 above. 4. Develop a test plan for the use case selected in task 3 above. Group component (5%) A report that consists of the work of all individual's work.

The major change to the course was the exam as it became clearer towards the middle of the semester that face-to-face exams were not possible. The exam was worth 55% and the other assessment was worth 45% (graded quizzes were worth 10%, Assignment 1 was worth 15%, and Assignment 2 was worth 20%). The replacement task for the exam would not be invigilated, making it difficult to justify that the task would still be worth 55%. One option was to adjust the weighting of the other assessments to 60% so the final task would be worth 40% (the minimum allowed in the school).

We consulted with students about modifications to assignment weights, and the chosen option was to:

- Keep the weighting of graded quizzes as 10%.
- Keep the weighting of Assignment 1 as 15% - students deemed it was unfair to change the weighting for assessment tasks that were already due.
- Increase the weighting of Assignment 2 from 20% to 35%
- The final task (Assignment 3) to replace the exam would weigh 40% instead of 55%.

We also consulted with students about the design of the assessment task that would replace a face-to-face exam holistically assessing their SA skills while maintaining a high level of academic integrity [Dawson, 2020]. Students agreed a recorded video interview was acceptable. In their video submission, students had to identify themselves, choose one out of three software methodologies (Unified Process, Xtreme Programming or Scrum) covered in the SA course, justify their choice, describe how to apply the chosen methodology for the use cases and the UML documents they have developed in Assignments 1 and 2, and finally, reflect on their learning experience by describing what they have learnt from the course, what they liked and disliked, the challenges due to COVID-19 and their strategies for overcoming the challenges.

We observed in previous offerings that students who did well in Assignments 1 and 2 tend to do well on the exam too. The design of Assignment 3 was based on this observation so we deliberately coupled the two previous assignments to Assignment 3. If students did not do Assignment 1 and 2, they had to understand enough to be able to present it. If this design achieved the goal then the final results should reflect this. In the next section, we will evaluate students performance across all four cohorts (three campuses and online) for this semester and compare students' performance from the previous year (pre-COVID-19).

IV. EXPERIENCE AND DISCUSSIONS

Table 2 shows the final results from 2019 and 2020 for online and three campuses in 2019 (pre-COVID-19) and 2020 (during Covid-19). The number of students at Campus C was very small in 2020 because several students dropped out soon after the transition to online learning. The online cohort in 2020 was slightly larger than the year before because some students in China transitioned to online when they were unable to resume their study on campus due to the closed border between Australia and China. We did not include the results from 2018 because Assignment 1 and 2 from 2018 are substantially different from those in 2019.

Table 2: The final results of students across four cohorts

Offering \ Cohort	Campus A	Campus B	Campus C	Online
2019-Sem1 Grade Distribution	(n = 11)	(n = 44)	(n = 8)	(n = 10)
80 +	0%	7%	25%	40%
70 – 79	27%	16%	13%	40%
60 – 69	36%	32%	38%	0%
50 – 59	27%	30%	25%	10%
< 50	9%	16%	0%	10%
2020-Sem1 Grade Distribution	(n = 28)	(n = 38)	(n = 4)	(n =17)
80 +	32%	8%	25%	35%
70 – 79	7%	16%	25%	24%
60 – 69	21%	13%	0%	18%
50 – 59	25%	20%	0%	6%
< 50	14%	34%	50%	18%

It appears that removing the face-to-face exam components have little impact on the final results in most campuses. Only Campus A sees a large increase in the number of HDs. A further investigation reveals that Campus A students did better in Assignment 1 and 2 compared to the students in 2019. It is also true that Campus A students did better in the replacement task compared to other campuses. It seems reasonable to assume that Campus A 2020 students were a strong cohort. Nevertheless, we feel that it is insufficient to explain such a big jump in the number of HDs. We feel more could be done to ensure the replacement task can differentiate between the students.

One way to ensure differentiation of students is to couple assignment tasks into the exam replacement task even more tightly. This could be achieved by having students analyse

incorrect UML models. The incorrect models could come from instructors or students submissions in Assignment 1 and 2, which would require students consent.

There was no course evaluation this semester due to the disruption in the delivery mode; however, to a certain extent, the exam replacement task provided some insights as students also reflected their learning experience during COVID-19: what they have learnt from the course, what they liked and disliked, the challenges due to COVID-19 and their strategies for overcoming the challenges. Students were surprised that analysis is such an important part of systems development. Some disliked creating the UML models while others liked them. Most students enjoyed working with an authentic system and creating screen prototypes using Invision. The reflections also showed that COVID-19 affected students differently: students who were on-campus struggled with the transition to online learning. They faced issues such as staying up-to-date with their work, lack of motivation and time management. Some online students were severely affected by COVID-19, such as losing jobs or having to care for other family members. The students also shared their strategies for overcoming the difficulties. Some students found online classes (instead of recording) were more helpful in keeping them up-to-date and motivated. The on-campus students also sought support from their peers.

Students insights from the reflection task proved to be more valuable than initially anticipated. They provided us with an understanding of how to improve the course; for example, some students found System Sequence Diagrams confusing. The insights from the reflective task also provided a channel for connecting with students. After the release of the final results, we posted a message to the course forum to acknowledge their challenges and to share their strategies of overcoming the challenges. We feel this was important as Semester 2 will continue in the online space.

We think the exam replacement assessment due to COVID-19 can be incorporated into the future delivery of the SA course face-to-face or otherwise. The tasks related to software development methodologies can be an in-class or tutorial exercise. Applying the methodologies to their subsystems even at a conceptual level may help students see the relevance of methodologies in systems development.

V. CONCLUSION AND RECOMMENDATION

In this paper, we described the design and delivery of a systems analysis (SA) course which is delivered as a series of workshops in both face-to-face and online settings. Authentic systems are used as the basis of the case studies for the assignments. We found that the design of the course and the use of a real system as the case study for assignments work well for both face-to-face and online settings.

Four weeks into the semester, all students transitioned to online learning and completed a video-based Assignment 3 as an exam replacement task. We changed the weightings of the assessments, but these changes were made in consultation with students. Assignment 3 requires students to choose one out of three software methodologies covered in the SA course, justify their choice, describe how to apply the chosen methodology for the use cases and the UML documents they have developed in assignments 1 and 2, and reflect on their learning journey during COVID-19.

The analysis of the final results shows that the replacement authentic assessment task was a reasonable replacement for the face-to-face exam but more could have been done to ensure that it can adequately differentiate students of different ability.

Students reflections showed that COVID-19 affected students differently: on-campus students tend to struggle with motivation and time management, but on-line students struggle with having more care responsibilities and losing their jobs.

We also found that incorporating students when making changes was important: they can provide some insights which we may have missed; for example, students thought it was unfair to change the weightings of past assessments, but it was acceptable for upcoming assessments.

Our recommendation for others when making changes to the course halfway during COVID-19 is therefore to:

1. View students as partners.
2. Use authentic assessments to replace face-to-face exams. One way of doing so is to couple the replacement assessment with previous assignments.
3. Allow students to reflect on their learning journey.

REFERENCES

Aronson, E. (1978). *The jigsaw classroom.* Sage.

Australian Computer Society. (2018). ACS Digital Pulse.

Chen, B. (2006). Teaching Systems Analysis and Design: Bringing the Real World into the Classroom. *Information Systems Education Journal.*

Cybulski, J., & Linden, T. (2000). Teaching systems analysis and design using multimedia and patterns. *Thirteenth Conference on Software Engineering Education and Training*. Austin.

Dawson, P. (2020). *Defending Assessment Security in a Digital World: Preventing E-Cheating and Supporting Academic Integrity in Higher Education*. Routledge.

Fatima, S., & Abdullah, S. (2013). Improving Teaching Methodology in System Analysis and Design using Problem Based Learning for ABET. *I.J. Modern Education and Computer Science*, 60-68.

Gackowski, Z. J. (2003). Case/Real-Life Problem-Based Learning with Information System Projects*. Journal of Information Technology Education*, 357-365.

Gulikers, J. T. M., Bastiaens, Th. J., & Kirschner, P. A. (2004). Perceptions of authentic assessment: Five dimensions of authenticity. *In Proceedings, Second biannual Northumbria/EARLI SIG assessment conference.* Bergen.

Suscheck, C., & Huff, R. (2007). Teaching Systems Analysis and Design. In M. Khosrow-Pour (ed), *Managing Worldwide Operations & Communications with Information Technology*.

Tanner, M., & Scott, E. (2015). A Flipped Classroom Approach to Teaching. *Journal of Information Technology Education: Research*.

Tepper, J. (2014). Assessment for learning Systems Analysis and Design using constructivist techniques. *Conference: Annual Learning and Teaching Conference 2014: Enhancing the STEM Student Journey.*

Victorian Skills Gateway. (2107). https://www.skills.vic.gov.au.

Wells, M. A., & Jones, B. (2005). Commonsense ISD: An empirical approach to teaching systems analysis and design. *Australasian Computing Education Conference*. Newcastle.

Yousif, N., & Naghedolfeizi, M. (2007). A Project Based Approach for Teaching System Analysis, Design, and Implementation Courses. *ASEE Southeast Section Conference*.

ABOUT THE AUTHORS

Jo-ann Larkins is a Scholarly Teaching Fellow in Statistics at Federation University Australia. As a SOTL researcher, Jo-ann explores curriculum and assessment, to embed authenticity whilst reducing anxiety and increasing students' self-efficacy. She loves a good scholarly conversation.

Suryani Lim is a lecturer at Federation University, Australia. She teaches Systems Analysis at Federation University and redesigned this course in 2018 to provide a more authentic learning experience for students