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Using Students' Perceptions to Increase Completion of Aviation Course Activities

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ABSTRACT

CONTEXT

Aviation courses have predominantly been chalk-and-talk. Although aircraft have advanced a lot over the decades, pilot training methods have not changed much. Literature shows that blended learning techniques have been successfully implemented in university courses in many disciplines. This study is part of a bigger project to integrate blended learning techniques into an aviation course. This study focuses on the completion of weekly activities in an aviation course, which is offered through the School of Engineering and Built Environment at Griffith University.

PURPOSE

In this study weekly activities were created. They were completed by students during the class, and after the class. This study utilised students' perceptions to increase completion of the weekly activities. The advantages and disadvantages of the activities, along with any challenges to complete them were understood. Student results were also evaluated to determine whether these activities increased student success and reduced failure rate across the two iterations.

METHODS

This study was part of an undergraduate aviation course, covering flight training theory content. Weekly activities were developed as short answer questions, video reviews, scenario-based analysis, critiquing real-world accidents. Qualitative and quantitative data was collected through perceptions survey and course analytics data. Students completed the survey at the end of the 12-week course. The study was conducted over two iterations, changing the activities from ungraded (Iteration 1) to graded (Iteration 2), based on student feedback.

OUTCOMES

Results show that students were in favour of the weekly activities. They felt that the activities helped them in their learning experience. However, completing non-graded activities were not prioritised by students. Even though they valued the activities, they requested marks to complete them. Total completion rate increased close to ten times, when students received marks. For ungraded activities (Iteration 1), completion declined 6% for every week of the 12-week course. For graded activities (Iteration 2), completion for all weeks was consistently higher than 95%. High completion of the activities had the benefit of reducing the course failure rates by 10%.

CONCLUSIONS

This study used student perceptions to increase completion of aviation course activities. While weekly activities were introduced by the lecturer, students input through the survey was the reason for the change. Engaging students as participants in the curriculum, led to changing the weekly activities from non-graded to graded with measurable positive outcomes for student success.

KEYWORDS

Student perceptions; weekly activities completion; overall course performance.

Introduction

Blended learning techniques, like flipped classrooms, are increasingly being implemented by academics. Such techniques are either viewed favourably or unfavourably by the students. McNally et al. (2017) categorises these as ‘Flip Endorses’ or ‘Flip Resisters’ respectively.

Blended learning techniques can be implemented by creating supplementary content (Twigg, 2003), to provide extra materials to the students. These materials can be given to students in several ways, for example pre-class preparation activities or post-class practice activities (Lefcort & Eiger, 2003). These activities, such as pre-class preparatory quizzes, help students prepare for the classes; and are preferred by students, who would like to see such activities incorporated in other courses they are taking (Brown & Tallon, 2015; Graham, 1999; Landrum, 2007).

Post-class homework can help reduce the failure rate, if it is completed by the students in a timely manner (Cosio & Williamson, 2019). One of the advantages of homework, particularly online homework, was the ability for teaching staff to provide timely feedback to students (Chow, 2015; Horstmanshof & Brownie, 2013). Online activities also provided the opportunity to practice the content multiple times, increasing the success achieved in assessments (Archer, 2018; Archer & Olson, 2018).

Students’ perceive that homework feedback helps them reflect on their strengths and weaknesses with respect to the course content. This process helped students transition towards becoming self-assessors of their work, instead of waiting for feedback from the markers (Landers & Reinholz, 2015). Similar results were found by Chew et al. (2016), where students were able to identify their strengths and weaknesses through reflective self-assessment. In both these studies, students felt that such techniques helped them improve for their future courses too.

Additionally, incentives play an important role in boosting completion rates for any course tasks, including assessments (Cullen et al., 1975). Hence, Hill et al. (2017) mention having incentives, like marks for homework, will make students value the post-class content. Students will see them as core components of the course and complete them. Radhakrishnan et al. (2009) also found that greater incentives, in the form of higher marks weighting for homework activities, led to better overall course performance.

In a study by Hill et al. (2017), additional online material was offered to students in a physics course. Results revealed that offering such material improved students’ understanding of the course content, along with increasing their motivation. Their study also mentions that such material is more effective if it is properly integrated into the course, which will increase student participation and completion of such activities.

The above studies show the benefits of having additional course materials, such as pre-class or in-class or post-class activities. However, there are limited studies which examine the effectiveness of such activities in the context of an aviation course; and further work is needed in the context of aviation education (Brady et al. 2001). Hence, in this current study student perceptions of in-class and post-class activities were examined, to increase completion rates.

Flight training courses are an essential part of the Aviation program within the School of Engineering and Built Environment at Griffith University. These courses include theoretical and simulation-based practical classes, both of which include in-class and home-study activities for student to complete.

This study was conducted in a theoretical course that consisted of content aligned to flight training syllabus. Weekly activities were developed, to be completed either during class or after class.

Furthermore, two iterations were implemented where these activities were un-graded (Iteration 1) and graded (Iteration 2). Students' perceptions were used to understand how to increase the completion rate of the weekly activities. Student results were also evaluated to determine whether these activities increased student success and reduced failure across the two iterations.

Methods

Participants

This study was part of a second-year aviation course, which is offered once per year through the School of Engineering and Built Environment at Griffith University. This study introduced weekly activities over two iterations, comparing two scenarios: Iteration 1 where the weekly assessments were non-graded (n=76, 80% response rate) and Iteration 2 where the weekly assessments were graded (n=65, 63% response rate).

Materials

The course consists of theoretical content related to obtaining a pilot licence and was administered through the University's Learning Management System (LMS). The course structure consisted of a 2-hour lecture and a 1-hour workshop per week. Each workshop had four activities, where the lecture content was applied to real-world authentic case studies or questions related to learning to fly (i.e. short answer questions, video reviews, scenario-based analysis, and critiquing incidents/accidents). These weekly activities were also designed to help students prepare for their assessments. A survey was made, to understand students' perceptions of the weekly activities' completion. The survey consisted of open and closed ended questions. These questions included multiple choice questions, Likert scale questions, short answer questions, accompanied by an electronic consent to participate in this study. The same activities and survey were used in both iterations of this study. The course content was also the same in both iterations of the study.

Procedure

Institutional ethical approval was obtained, allowing this study to be conducted in a classroom setting. Students had access to this study's Information Sheet and Consent Statement, which were downloadable from the course site. Students were advised that participation in this study was optional. They were also reminded that their participation in this study would not influence their grades or relationship with the academic staff or the university. Students provided electronic consent by selecting 'Agree' to participate in this study. The course was delivered in a hybrid teaching mode, with students attending either in-person or online. All students attended classes and completed assessments and weekly activities as a part of their course enrolment. All the weekly activities were offered through the LMS course site, giving students 24/7 access to them; although students had to submit the weekly activities by the due date, to receive feedback from the lecturer. Three of the weekly activities were completed during class, whereas the fourth was assigned as homework. Homework was discussed in class too, giving students an understanding of the activity they were attempting. The survey was completed at the end of the course, in the final week of a 12-week course. All these procedures were followed in both iterations of the study, except in Iteration 1 the weekly activities were ungraded and in Iteration 2 the weekly activities were graded. Students were still encouraged to complete the activities even when they were ungraded. In both iterations, students were encouraged to undertake the anonymous survey to assist in understanding how to improve the weekly activities for the following iteration of the course. Based on the survey results of Iteration 1, weekly activities became graded in Iteration 2 of this study, comprising 10% of the overall course grade.

Analysis

Survey data was anonymised and analysed once the course had concluded, and all student grades were published. During this process all identifying student information was deleted. Quantitative and qualitative data was collected from the two iterations of this study. Qualitative

data included data from the open-ended questions. It was analysed thematically, and even some direct quotes are discussed. Quantitative data was collected through the closed ended questions. It was analysed using descriptive statistics and shown as percentages for each category through bar chart and scatter chart.

Results and Discussion

Qualitative data is shown as direct quotes, and in Table 1 categorised by overall themes. Quantitative data is shown in Figure 1 as a bar chart, in Figure 2 as a scatter chart, and in Table 2 as percentages. The below results show the data combined from both iterations of the study.

Table 1 shows the overall results of why students completed the weekly activities. This table thematically categorises the students' responses. The positive theme shows that students viewed the activities favourably; and participated in them to gain the most out of the course. These students went beyond the minimum requirements of the course. The neutral theme shows that students were indifferent about these activities; and participated in them to stay on track with the course. These students possibly used the activities to meet the minimum requirements of the course, and cope with the course content. The negative theme shows that students viewed the activities as an extra burden; and didn't choose to complete them if they didn't have to. These students avoided any course activities that were not required to be completed by them.

Figure 1 shows the students responses on the four Yes or No questions. The first question asked if students found the weekly activities provided a structure for their self-guided study. 84% of the students thought that the activities did assist in their personal study. This is a positive result and pleasing to see. Hence, activities like these are beneficial to be included; which could even help students manage their time and study load. The second question asked if students found any challenges while completing the weekly activities. Results show that despite receiving a structure through the activities, most students (75%) felt that they still faced challenges while trying to attempt and complete the weekly activities; like other personal and professional life commitments. This is a negative result, yet students were still in favour of such activities as seen in the next question. The third question asked if students wanted to see similar weekly activities in other courses. Results shows that most students (92%) wanted to see similar activities implemented in other courses. This is in alignment with literature too (Brown & Tallon, 2015; Graham, 1999; Landrum, 2007). This question also has the highest percentage out of all the four questions, and the results of the next question provide guidance on how to achieve this outcome. The fourth question asked if students wanted the weekly activities to be graded or non-graded. Results shows that most students agreed that the activities should be graded (83%). This preference provides a guidance on how to include the weekly activities, as a marked task counting towards the overall grade. Overall, students did face challenges while trying to complete the weekly activities. However, they saw the benefits like having a structure for study, and even wanted to see it in other courses. Hence, having grades associated with the weekly activities would help students organise their commitments to ensure the activities are completed. Grades could help them overcome the challenges and prioritise completion of the weekly activities.

Table 1: Overall perceptions categorised into positive, neutral, or negative themes.

Positively Perceived Responses	Students within this category felt that they wanted to complete the activities. This helped them perform at their best in the course. The common themes found within the responses were that the students wanted to learn more about the course content; to increase their understanding of the weekly topics; and to get the best mark.
Neutrally Perceived Responses	Students within this category felt that they needed to complete the activities. This helped them cope with the course content. The common themes found within the responses were that they wanted to get a good mark in the course; they wanted to stay up to date with the content; and they wanted to manage their time.
Negatively Perceived Responses	Students within this category felt that they must complete the activities. They might not have seen the benefit offered by the weekly activities. The common themes found within the responses were that students felt like they had to complete yet another task; they had a low desire to complete non-marked tasks.

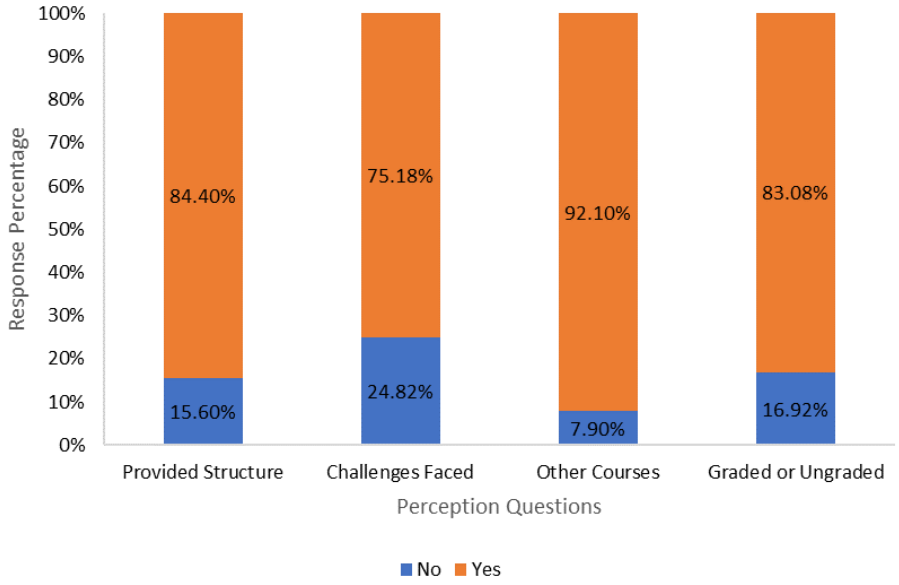

Figure 1: Students' ratings on the four questions broken down as yes or no percentages.

The quotes below once again show that the weekly activities were relevant and helpful. Students felt that the activities were valid and reasonable amount, which had great impact to understand the topics. Students also felt that more feedback would be beneficial. Different types of feedback were also suggested, including group, individual, text in combination with verbal feedback. These responses are great suggestions to implement in the future. It is also pleasing to see that students understood the commitment required by the academic to provide individual feedback.

> *I found the activities were perfectly valid and reasonable amount. Hence no changes will be required.*
>
> *For the most part the task seemed to have a great impact on my understanding of the material.*
>
> *The course content really helped me to understand topics related to the assignment.*
>
> *Perhaps elements of individual feedback rather than group feedback would be more helpful personally, although I understand this would be a lot of work each week.*
>
> *It may also be worthwhile to provide text-based feedback in addition to the verbal feedback due to the different ways people learn.*

In relation to feedback, one recommendation could be to embed automated feedback. This could provide instant and timely feedback (Chow, 2015; Horstmanshof & Brownie, 2013). If designing

preparatory activities, like pre-class multiple choice quizzes; then automated feedback could provide explanations for all the answer options which will let students know why an answer is correct or incorrect. Being fully online, such activities could also give students the option of multiple attempts; increasing performance, as revealed through literature (Archer, 2018; Archer & Olson, 2018). Finally, such feedback could help students become self-assessors of their performance (Chew et al. 2016; Landers & Reinholz, 2015); meaning they will learn to be critical thinkers of various problems in their future career too. This not only enhances students' performance in university classes, but also prepares them for the industry.

Table 2 shows how much of the total weekly activities students completed. It is a comparison of graded and non-graded completion percentages. The results show that non-graded completion varied substantially, with some students completing only a small percentage of the activities; while only a small percentage of students completed all the weekly activities. The results show that almost half of the students completed below 50% of the activities, while approximately the other half completed above 50% of the activities. On the contrary, overall completion percentages for graded weekly activities were much higher; with most students completing almost all of the activities. The results show that only 1.5% of the students completed below 50% of the activities, while the remaining students completed above 50% of the activities. Almost 90% of the students completed all the activities. Total completion was almost ten times higher for graded activities, compared to non-graded activities.

Table 2: Comparison of overall weekly activities completion rates for both iterations.

	<10%	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**
Iteration 1 [Non-Graded]	10.5%	5.3%	15.8%	10.5%	9.2%	15.8%	14.5%	3.9%	5.3%	9.2%
Iteration 2 [Graded]	0.0%	1.5%	0.0%	0.0%	0.0%	0.0%	1.5%	3.1%	4.6%	89.2%

The above table shows a clear distinction between the graded and non-graded activities. Below are some quotes from the survey results of Iteration 1 of this study. They show that having some kind of incentives, like grades, for the weekly activities would increase the completion rates. Hence, even though students found the weekly activities to be of value, students wanted marks to complete them. Marks would help them overcome challenges, like lack of motivation, or not prioritising unmarked activities. This is supported by the above Table 2, which show a higher completion rate for graded activities. This is further supported by Figure 1 where students wanted grades associated with weekly activities; and by below Figure 2. Hence, it is recommended that grades be assigned to weekly activities, which will not just increase completion; in turn help students grasp important concepts and better prepare for assessments. This is aligned with literature, which shows that incentives like grades play an important role in completion of any course tasks (Cullen et al., 1975). It is also recommended that activities related to important course concepts could carry a higher grade value, which could improve overall course performance (Radhakrishnan et al. 2009). If choosing to include a combination of graded and non-graded weekly activities, then proper integration is important, as it will increase student participation and motivation to use such weekly activities (Hill et al., 2017). This is not just related to grades, but also careful consideration of deadlines. As literature suggests, incentives lead to completion; and a separate study revealed that timely completion leads to better performance in the course (Cosio & Williamson, 2019; Cullen et al., 1975; Radhakrishnan et al. 2009). The survey results also support this with the first quote showing student's interest to be involved early in the course to lay a positive foundation for the rest of the course.

> *In future courses I will strive to become involved in the activities and discussions early on in the semester to lay a positive foundation for the remainder of the semester.*

From the perspective of someone who didn't do them, my main reasoning was lack of motivation.

When I have so many other assignments or quizzes to do that actually go towards the subject's grades, an unmarked piece of work seems unsubstantial.

Most student do not prioritise something unless it gets marked and gets counted towards the grade.

Although I had significant time restraints throughout this course and do appreciate the fact that all attendance and activities were not essential, I believe that perhaps making a percentage of the course marks allocated to the completion of weekly activities could help.

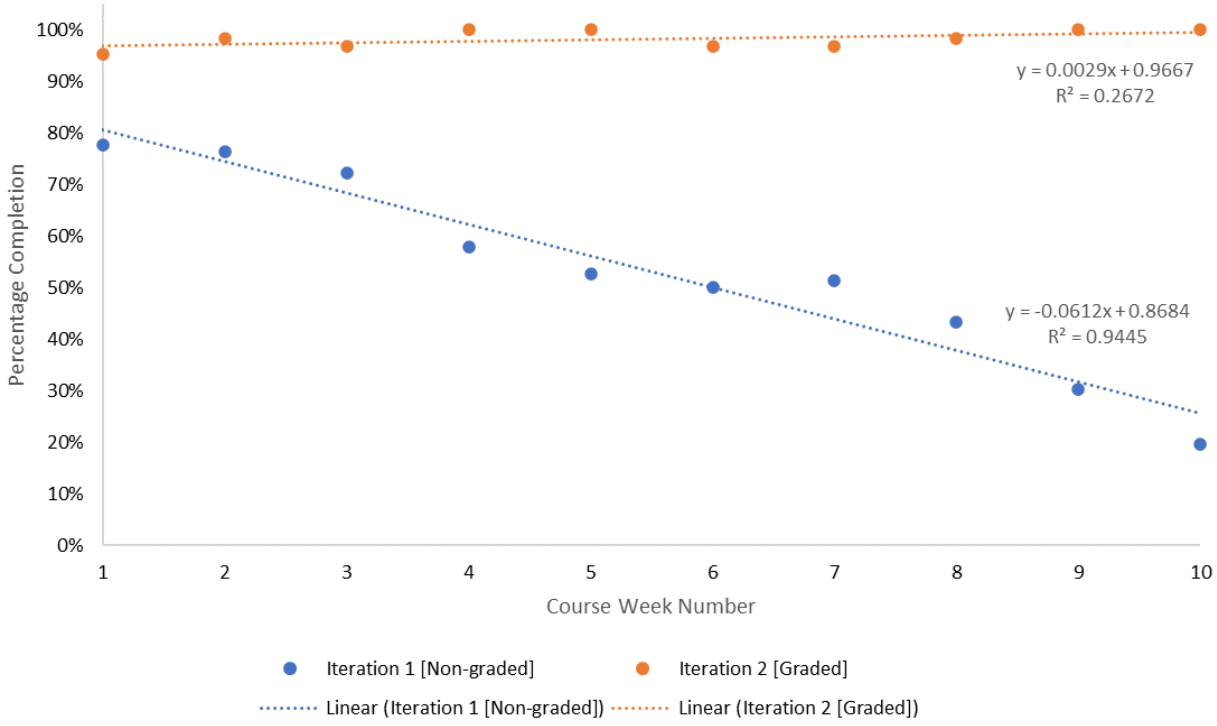

Figure 2: Comparison of individual weekly activities completion rates for both iterations.

Figure 2 shows the comparison of how many of the individual weekly activities' students completed from both iterations of the study. It consists of data of weekly activities completion, shown as percentages. The results shows that completion rates for graded weekly activities were much higher for all the weeks. Most of the weekly percentages show that the activities were completed by almost all students. Completion rate was consistently above 95% for all weeks. On the other hand, non-graded completion reduced as the weeks went on. Completion rate was more than 70% for the first third of the course, then went down to approximately 50% for mid part of the course and reducing to below 20% in the last week of the course. There was a 6% reduction in completion rate per week as the weeks progressed.

As the above results show, there were many benefits that the weekly activities provided. For example, students found them to be helpful particularly if they were struggling. This led to some other positive outcomes also. Many students found the activities to be assisting in assessment preparation too.

I feel I would have done a much poorer job on the assessment if I hadn't completed the activities.

Had feedback not been provided on this subject matter I have no doubt that writing this assessment would have taken twice as long.

I think that the weekly activities helped me prepare for this assessment, in that it forced me to really look into the content and understand it ahead of time.

I do believe that had I completed all weekly activities and kept on top of my responsibilities perhaps I may have garnered greater marks.

I'm really not sure how much difference they made as I already enjoy and understand this subject quite well. I do think however, if I were struggling more with the content that they could have really helped me to understand and absorb the content better.

The above quotes from the survey responses show that the feedback students received benefited them in completing the assessments. Students felt that they would have done poorer or would have taken twice as long; had they not completed the weekly activities and received feedback. The activities created a structure, as shown in Figure 1, which made students work on the assessments ahead of time. Even a student who had a good prior knowledge of the content felt that the activities are beneficial for learning purposes. These quotes are also supported by the overall course results, which show an improvement in overall grades for Iteration 2 of the study.

Comparing the overall course failure rates between the two iterations of this study; the results reveal an improvement of almost 10%. In Iteration 1, course failure rate was 20.4%. In Iteration 2, course failure rate reduced to 10.6%. The weekly activities were designed to support the students learning during the course. The activities helped students understand the content in real world context. This had an impact on all other course tasks, like assignments too. This result could be used to encourage the future students of the course; mainly to increase total completion rate even more. For example, the 10% of students who did not have total completion rate in graded iteration of the study; in future, such students could be motivated to complete all the activities to achieve a higher overall grade.

The current study provides an insight into implementing weekly activities in an aviation course. Further research is needed to understand the learning habits of students in an aviation classroom context. Studies could be conducted in the aviation industry too; and not just the university classrooms. Moreover, this study only looked at during-class and post-class activities; pre-class activities were not explored, neither was a full flipped classroom environment implemented. Combining all pre-, during, and post- class activities could provide valuable resources to the students, as literature shows (Brown & Tallon, 2015; Graham, 1999; Landrum, 2007; Lefcort & Eiger, 2003; Twigg, 2003). The results of the current study show that students were in favour of such activities. It could be beneficial to understand if students will be in favour of a fully flipped classroom in the aviation context (McNally et al., 2017). There was also no comparison made between the aviation students and other disciplines, which could be studied further; as literature suggests there could be a difference (Brady et al. 2001).

The current study implemented weekly activities in an undergraduate aviation course, offered through the School of Engineering and Built Environment at Griffith University. The results showed that students favoured such activities. However, they had low engagement with the non-graded iteration of this study. Non-graded activities gained little priority over other commitments that students had. As mentioned in the direct quotes, students 'strive[d] to' complete the activities, but 'lacked motivation', and priority was given to 'other assignments'. Students were willing to take steps to engage with such activities if they received something more in return, than merely attempting and completing them. If 'it gets marked' and includes a 'percentage', then that 'could help' in 'completion of weekly activities'. This is further supported by Figure 1 and Figure 2, which shows that students preferred the weekly activities to be graded, and clearly had near full completion when they were graded, as shown in Table 2. Students' preference of graded weekly activities was mentioned in both iterations of this study. Based on the perceptions results, the activities were changed from being non-graded to graded. Graded activities increased completion rates, as the students did not want to miss out on marks; and saw higher value in the activities. This change also reduced the overall course failure rate by 10% which shows the effectiveness of implementing the graded weekly activities.

Conclusion

This study demonstrates the benefit of engaging students as co-designers in their curriculum. Weekly activities were modified through a student led desire to engage with the materials, and their feedback that they required these activities to be graded to maintain their weekly completion rates. The analysis of their perceptions did increase the completion rate of the course activities, leading to better overall course results. This study is part of a bigger project, to enhance the student learning experience and success in an aviation course.

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