



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Digital badges in initial teacher education

Evaluation report

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Executive Summary

Project Summary

Aims

This project set out to explore the impacts (both positive and negative) of replacing marks with digital badges on courses within an initial teacher education programme.

Overview of design

For the first two courses in the project all students were provided with written feedback, but their marks were replaced with digital badges, which were linked to assignment rubrics. For the third course marks were withheld but badges were not provided. Students and staff had the option to opt into the research on a voluntary informed consent basis.

Research team roles

For the first two courses, two members of the project team explained the badges to students and issued badges. A third member of the project team who had no role in the transaction of the course recruited participants and generated the data.

For the third course the third member of the project team, who had no role in the course, recruited participants and generated data.

Participant numbers

| Course | Total No. Staff | No Staff participants | Total No. Students | No Students participants |
|--------|-----------------|---|--------------------|--|
| 1 | 1 | 1 | 6 | 1 (all elements) |
| 2 | 20 | Survey 1: 9 Survey 2: 7 Survey 3: 10 Interviews: 8 | 860 | Baseline survey: 199 Survey 1: 133 Survey 2: 87 Survey 3: 42 Focus group: 15 |
| 3 | 3 | 1 (all elements) | 72 | Baseline survey: 5 Survey 1: 4 Survey 2: 2 Survey 3: 2 Focus group: 2 |

Methodology

This was a qualitative study.

| | Start of course | After assignment ... | | | End of course |
|-----------------|-----------------|----------------------|----------|----------|---------------|
| | | 1 | 2 | 3 | |
| Staff | Baseline survey | Survey 1 | Survey 2 | Survey 3 | Interviews |
| Students | Baseline survey | Survey 1 | Survey 2 | Survey 3 | Focus groups |

Pilot Findings

| Research Question | Findings |
|--|--|
| What impacts did implementing digital badges have on students? | <p>For most students replacing marks with digital badges increased their uncertainty about how they were performing on the course and how much work they needed to do on subsequent assignments in order to pass the course. This caused many students anxiety.</p> <p>Many students found the badges hard to interpret, and having to locate the badges in a different system was problematic (badges were issued in a system called My eEquals rather than in the LMS).</p> <p>For a minority of students – generally ones who were performing at a high level – the badges were perceived positively. Indeed, for a small number of these students they seemed to reduce their stress because they were not worrying about their specific mark.</p> <p>The badges did seem to lead to greater engagement with the rubric and the feedback on the assignments than would have been the case had marks been being awarded. This was because students had to engage with the badges and the rubric in order to understand their performance on the assignments.</p> <p>Some students perceived that tutors were providing less written feedback because of the badges. However, tutors had been explicitly told that they should provide the same level of written feedback as on previous assignments (which did not use badges).</p> <p>On the third course providing feedback on the rubric, but not issuing badges or a mark seemed to have the same positive impacts as seen with the issuing of badges (e.g. greater engagement with the feedback) but without causing so much confusion or stress as had been experienced when badges were issued instead of marks.</p> |

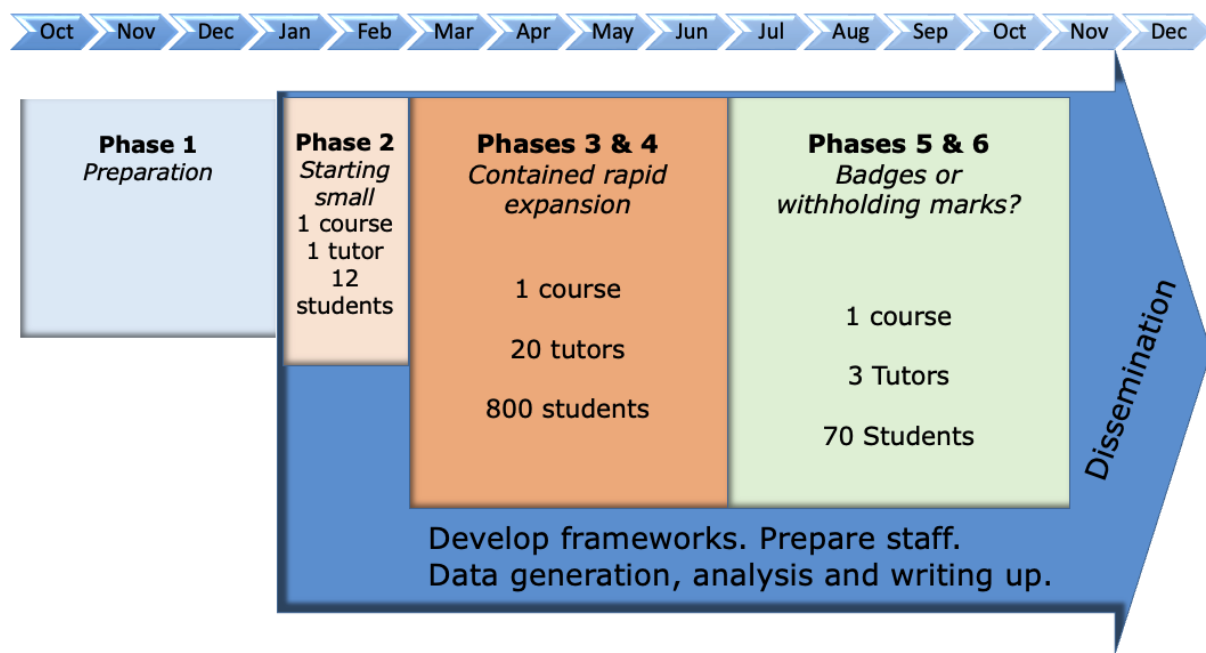
| | |
|--|---|
| <p>What impacts did implementing digital badges have on staff?</p> | <p>For the course coordinators using badges caused extra work as they had to create new rubrics for the assignments which aligned with the digital badges. They then had to explain why badges were being used and what they meant to the students (who were used to having marks).</p> <p>For markers the use of badges caused extra work as they had to indicate which badges to award on the assignment (in the LMS) and then record the actual mark (which was required by the University) in a separate spreadsheet. At the end of the course the course coordinator then had to import those marks back into the LMS so they could be recorded in the University's official records.</p> <p>For the research team issuing badges caused considerable extra work: exporting data from the LMS about which badges to issue; manually cleaning up that data (e.g. making sure that no errors had been made in recording it; removing unnecessary fields); generating student email addresses (which were not included in the exported data); splitting the data up so that all the data for each badge was in a separate CSV file; importing the CSV file for each badge individually; notifying students that their badges had been issued and telling them how to access them.</p> |
| <p>What other impacts did implementing digital badges have?</p> | <p>Having to create new rubrics for the assignments led to an improvement in the quality of the rubrics and a clearer focus within the assignments and the courses on the Graduate Teaching Standards (which students have to demonstrate they have met in order to quality).</p> <p>The process of creating the rubrics led to an enhancement of the SOLO taxonomy – see https://halfbaked.education/solo2-0/ for more details.</p> <p>The project has stimulated the University to put in place governance structures to manage the use of digital badges, and has increased understanding of the technical issues associated with issuing digital badges (see the project Implementation Reports for more details).</p> |

Introduction

The primary aim of this research was to collect/analyse data on any impacts of the introduction of digital badges.

The project was designed in six phases (see Figure 1).

Figure 1: The phases of the project



With respect to **Phase 2** specifically, a key aim was evaluating the appropriateness and effectiveness of the recruiting process, research instruments, and research processes with a small group of participants (6) before rolling out with a larger cohort in Phase 4 (>800 students).

The aim of **Phase 4** was to implement the refinements resulting from Phase 2 and evaluate the impact of digital badges across a large cohort (860), including:

- Student perceptions of digital badges
- Student engagement with assessment feedback
- Student engagement with the Graduate Teaching Standards
- Tutor perceptions of digital badges (e.g. impact on marking, impact on student engagement with feedback)
- The administration associated with the awarding of digital badges.

The aim of **Phase 6** was to gauge the impact of withholding grades without awarding digital badges on a small cohort of students. Specifically, data from Phase 4 IntroToEd Assignment 3 and Phase 6 were used to distinguish between the effects of awarding badges on the one hand and withholding grades on the other.

Research Methodology

Methodology [Oct 2021-Nov 2021]: the project methodology was developed and refined, and the survey instruments created. The research was mixed methods and consisted of four semi-structured online surveys, one semi-structured focus group interview, journaling by course coordinators, and notes from the tutor marking the assignments.

Surveys: the surveys consisted of a baseline survey designed to capture a participant's relevant background information and three post-assignment surveys designed to capture the participants impressions after receiving digital badges, as well as any impact this might have on their understanding of the Australian Professional Standards for Teachers.

Focus group interview: the focus group interview was conducted at the conclusion of the unit and was designed to capture participants overall impressions of digital badges as well as provide scope for any other views or feedback.

Journaling: Journaling by Course Coordinators including information about the course transaction, any issues that arise, any emerging impacts of the move to using digital badges/frameworks, and possible solutions.

Tutor notes: tutor notes were taken individually and drawn upon in the tutor interview.

Ethics approval [Dec 2021]: human ethics approval for the above project design was obtained from the University of Newcastle in December 2021.

Ethical approval for the NTPA phase of the project was granted on the 28th of August 2022.

If we have to change the focus from students to employers for the NTPA phase of the project, then we will need to have a variation to the existing ethical approval agreed.

Recruitment

Phase 2: Jan 2022 For the first two courses in the pilot (EDUC1048) the course coordinators were members of the research team and have volunteered to take part in both elements of the pilot. At the start of phase 2 the Research Fellow explained the research to the students and give them the option to take part in the research if they wish to do so. It was made clear to the students that their participation is entirely voluntary and that the staff teaching the course will not be told which students are taking part in the research.

Phase 4: Feb-Aug 2022 The recruitment process and resources were refined for Phase 4, though it was still based around the Research Fellow explaining the research to the students and giving them the option to take part in the research. It was made clear to the students that participation is entirely voluntary and that the staff teaching the course will not be told which students are taking part in the research.

Sample Size

Phase 2: Jan 2022: As anticipated, Phase 2 was a small-scale study on a course (EDUC1048) that had one Course Coordinator and 6 students. Of the 6 students, 4 gave consent to participate in the research. Of the 4 that gave consent, only 1 student completed all four surveys and participated in the interview. The low completion rate was an issue that was identified and needed to be addressed before Phase 4 began (see C-5 below).

Phase 4: Feb-Aug 2022: The sample size for Phase 4 was significantly larger, though participant attrition was still a factor; of 860 students undertaking the course, 248 consented to participate, 199 completed the baseline survey, 133 completed the assignment 1 survey, 87 completed the assignment 2 survey, 42 completed the assignment 3 survey, and 15 participated in interviews. With respect to tutor data, there were 9 responses to the assignment one survey, 7 responses to the assignment 2 survey, and 10 responses to the assignment 3 survey. 8 tutor interviews were conducted.

Phase 6: Jul-Nov2022

The sample size for EDUC1038 in Phase 5 was small, though this reflects the smaller number of students enrolled in the course (72). 5 students completed the baseline survey, 4 completed survey one, 2 completed survey two and 2 completed survey three. One tutor completed all three tutor surveys. Two student and one tutor interviews were conducted.

Data collection

Phase 2: Jan 2022 – April 2022 and Phase 4: Feb-Aug 2022: all surveys were created in SurveyMonkey and distributed via a link in emails. Interviews with course coordinator and student participant were conducted via Zoom. Journaling by the course coordinators was facilitated by a shared document in Microsoft Teams.

Data Analysis

Phase 2: Feb 2022 – April 2022: Prior to analysis data was anonymised and pseudonyms given to all participants. The questionnaires included both numeric data (e.g. from Likert scales) as well as non-numeric data (e.g. free text responses). The analysis of both numeric and non-numeric data was informed by Shaffer's (2017) guidance on well-formed data tables. Numeric data was analysed using descriptive statistics. Non-numerical data (e.g. from journals, tutor feedback and focus group interviews) was analysed using Emergent Theme Analysis (Wong and Blanford, 2002).

Phase 4: Feb-Aug 2022: Prior to analysis data was anonymised and pseudonyms given to all participants. The questionnaires included both numeric data (e.g. from Likert scales) as well as non-numeric data (e.g. free text responses).

Results

Key findings from Phase 2:

Phase 2 provided valuable feedback on the points identified in Q2 and allowed the project team to make some important adjustments, which will be considered below.

The recruitment process: initial recruitment proved effective, with 4 from 6 students agreeing to participate in the research. The recruitment materials (including scripts and slides) used in Phase 2 was deemed suitable for continued use.

Research instruments: the survey instruments were effective, though some modifications (such as simplified titles) were made at the conclusion of Phase 2.

The impact of digital badges: data from Phase 2 indicated that badges were effective in both driving engagement with assignment feedback and deepening student understandings of the APST, but only after targeted support was provided. Survey responses collected after Assignment 1 indicated that participants were unsure about how the badges related to the criteria in the assessment task and were unsure as to whether they had passed the task or not (in the absence of a grade). Participants also indicated that additional explanation and contextualisation of digital badges in light of the assignment would be helpful.

In response to this initial data additional explanations and support materials were provided, including discussions around how the badges related to the assignment criteria, discussions around how the badges relate to both the APST and the Competency frameworks, and the creation of a 'badge tree' showing how all the badges from EDUC1048 fit together.

Following this intervention student responses in both the Assignment 3 survey and the interview indicated that badges led to a more strategic engagement with feedback (as the participants did not have a simple mark to gauge performance with but now more clearly understood what the badges meant) and a deepening

understanding of the APST (once the relationship between badges and the APST was clear deeper learning resulted). This data will be analysed and discussed in detail in the Implementation Guidance.

Key Findings from Phases 4 and 6:

Introduction

The findings from Phases 4 and 6 of this study related to Level 3 badges (i.e. ones awarded at the level of criteria on an assignment) will be presented in three sections. Section 1, Results, will **report** on data shedding light on student perceptions of the digital badges. Section 2, Discussion, will **analyse** the impact that digital badges had on students in the current study. Section 3, Recommendations, will draw upon data from Sections 1 and 2 to make **recommendations** for future practice based on the findings of the current study.

1.1 Student perceptions of digital badges

A key focus of data analysis in Phase 4 was tracking students' overall perceptions of the implementation of digital badges. All non-numeric data (online survey responses and interview transcripts) were coded using the qualitative data analysis software NVivo, and factors that influenced student perceptions in a positive or negative way were identified inductively. Each 'code' referred to a statement made that indicated either a positive or negative perception of digital badges.

On the highest level, student perceptions of digital badges tended to be negative, with a total of 273 codes against negative factors compared with 179 codes against positive factors. The specific categories of 'positive' and 'negative' factors, and the number of codes against them, are illustrated in Tables 1 and 2 below.

1.1.1 Positive

Table 1: Coding against factors that positively influenced student perceptions of digital badges (ranked)

| Positive influencing factors | Total codes | Assignment 1 (A1) | Assignment 2 (A2) | Focus Group (FG) |
|--|-------------|-------------------|-------------------|------------------|
| Badges leading to more engagement with feedback (ME) | 53 | 4 | 10 | 39 |
| Good quality feedback (GQF) | 40 | 15 | 22 | 3 |
| General positive comments (GP) | 26 | 7 | 4 | 15 |
| More engagement with the GTSs (GTS) | 21 | 0 | 0 | 21 |
| Student views of badges changing positively (VCP) | 18 | 0 | 0 | 18 |
| Badges reducing anxiety around grades (GA) | 15 | 0 | 0 | 15 |
| Badges increasing student self-efficacy (SE) | 6 | 1 | 0 | 5 |

Broadly speaking, the positive factors identified provided evidence to support the initial hypothesis that badges would improve student engagement with feedback. The highest category specifically related to improved student engagement with feedback (ME:53), and is illustrated by the comment below:

[[t] was probably useful spending more time on the rubric, even though I might have found it a bit stressed trying to figure it out. It made me kind of reflect on my work a little bit more. So I think before I submitted it, I was like, "Okay, I really want to get this badge. What I have to do," kind of thing. And then when I got those badges, I kind of had to go check what the badge was for, and then read what I actually achieved during that badge. I check my assignments to see what I had done. So I was checking it a lot more than usual. So I think it helped me improve with my next few assignments in this course. So I thought that was really helpful. (ME. FG. R3)

The second highest category related to positive comments around the quality of the feedback (GQF:40), and in particular badges indicating to students where they went well and where they could improve:

I found it fairly helpful as it allowed me to be able to easily see what areas need work and what are up to standard already (GQF. A1. R5).

General positive comments (GP:26) related to comments that expressed a general positive opinion of the badges such as:

I think the badges are great (GP. A2. R1)

It's like a medal at a sports carnival. That's what I see it as. It's a fun way to share the grades, I guess. And we all had the exact same opportunity. (GP. FG1. R3)

There was also evidence to suggest that digital badges led to greater engagement with the Graduate Teaching Standards (GTS:21):

They forced me to look back over the standards. I would read some of the criteria and then I'd be like, "Oh, where does that relate to?" And I'd go back and have a little look at the standards, see where it's from and where I need to target. (GTS. FG. R2).

It appeared that student perceptions of digital badges became more positive over the course of the semester (VCP:18):

For me, I am a person who likes number grades. So when I started off, I was thinking it would be neutral. I was just kind of like, oh, okay. Then I'll just wait, read the feedback. But like [the other focus group participant] said, as it progressed, the badges turned more into a positive experience for me. (VCP. FG2. R4)

This particular trend will be discussed in more detail in the next section.

The remaining positive coding categories – including badges reducing anxiety around grades (GA:15) and badges increasing student self-efficacy (SE:6) – came as a surprise to the research team and will be discussed later in this section.

1.1.2 Negative

Table 2: Coding against factors that negatively influenced student perceptions of digital badges (ranked)

| Negative influencing factors | Total codes | Assignment 1 (A1) | Assignment 2 (A2) | Focus Groups (FG) |
|---|-------------|-------------------|-------------------|-------------------|
| Uncertainty due to lack of mark (NRM) | 83 | 29 | 26 | 28 |
| The need for more explicit feedback (MEF) | 82 | 43 | 32 | 7 |
| Badges hard to interpret (BHI) | 67 | 34 | 13 | 20 |
| More initial support desired (MIS) | 10 | 4 | 0 | 6 |
| Badges hard to locate (BHL) | 10 | 6 | 0 | 4 |
| General negative comments (GN) | 9 | 3 | 3 | 3 |
| More integration with the LMS (LMS) | 9 | 1 | 2 | 6 |
| Receiving grades on other courses (RGO) | 3 | 3 | 0 | 0 |

The key factors that negatively influenced student perceptions of digital badges included uncertainty due to a lack of marks (NRM:83), and the need for more explicit feedback (MEF:82). These two categories of code are related and were the most prevalent across all the surveys. Examples of comments of this type have been

included below:

So far I am not a big fan. I would prefer to know my marks as well, that way I am aware of what I need in the next assignment in order to pass the course. Not knowing this is actually making me very anxious. (NRM. A1. R4)

After getting my badges for the second assessment I have no idea what mark I need to pass the course which puts extra stress on me in a time where there is already plenty of stress on me. (NRM. A2. R6)

I didn't find the feedback very helpful. This is because I don't exactly know where I went wrong and what I can do to improve for next time (MEF. A1. R16)

I think the use of the digital badges would be successful if certain changes were made for the future. For example written feedback provided with the badges (MEF. A1. R19)

That they are ineffective as a sole grading method in my experiences up until now. I have not changed my thought that I do think they should play a role as they are beneficial to my understanding of how I am going in relation to the standards although should not be the sole method of marking as it does not convey enough information for me to use going into assessments following. (MEF. A2. R5)

It is noteworthy that for Assignment 1 these two categories of comment may have been exacerbated by a delay in the release of feedback – without a specific mark to indicate performance students relied more heavily on assignment feedback to ascertain performance (as per the project rationale). However when the feedback is not received concurrently with the badges (due to a technical issue there was a delay of about 1 day) students are left with both insufficient feedback and no grade to calibrate their expectations. This was reflected in student comments:

I was unaware that we would be receiving additional individualised feedback later so my initial reaction was confusion with how the badges offered

feedback. It felt generic and impersonal. I benefit most from individualised feedback and felt disappointed that without marks to offer a gradient of how close I potentially was to a higher ranking E.g. borderline Distinction to High Distinction I do see the value in the badges but personally the marks are more effective for offering more specific areas to review for improvement and to what degree improvement needs to be made. Perhaps if it were clearer that we would receive additional personal feedback this would be avoided. (MEF. A1. R9)

Despite being exacerbated by the delivery of feedback in Assignment 1, these two interlinked categories remained important in Assignment 2, and represent the core of the negative response to digital badges. This will be discussed further in the next section (considering the impact of digital badges).

Other negative coding categories included the badges being hard to interpret (BHI:67), which reflected student difficulty in making connections between the digital badge and their performance on the assignment:

I was very confused about my results. I could access the badges but was unsure what they each meant, if they colours meant anything different or if I had passed the assignment in general. (BHI. A1. R14).

Some students also found it hard to locate their badges (BHL:10):

I found just going onto My eQuals and finding the badges, and making sure they were the actual badges for our assignments, I got a bit lost in the process of finding them. (BHL. FG3. R1)

Negative comments about difficulties with locating badges (BHL) and finding it hard to interpret them (BHI) decreased for Assignment 2 – presumably because students were becoming familiar with the process of receiving badges. For example, the total number of comments relating to badges being hard to interpret (as a proportion of total negative comments) decreased from 30% in Assignment 1, to 18% in Assignment 2.

Linked with this was a desire for the badges to be integration with the Learning Management System (LMS:9), so that all grading information was in the one location:

It was a little bit disjointed, I guess, because everything has been moved onto Canvas, so...pretty much everything is on the one platform and then the badges weren't, so it was also sort of, I couldn't look at the badges directly side by side with the actual assignment. So I feel like that may have made it more simple for me. Maybe if it was just a visual thing that was right next to it and along with everything else rather than a separate website in a different tab or something so yeah. (LMS. FG10. R1)

General negative comments (GN: 9), which were comments classed as negative but not tied to any specific feature or effect of the badges, were spread evenly over the duration of the course (From Assignment 1 to the Focus group at the end of the course).

E.g. *I did not like the digital badges (GN. A1. R3).*

Some feedback indicated that students needed more initial support (MIS:10), which reflected students' desire for more up-front training and instruction about badges before receiving them.

E.g. more explanation about how to read it, maybe. Just as an introduction in the course like, 'Oh, this is the type of feedback we'll be giving. This is how to read it. This is what each badge means.'" A bit more in depth, I guess. (MIS. FG11. R1)

Some students remarked on the lack of consistency between courses, noting that all their other courses awarded grades rather than badges (RGO:4).

E.g. Quite confusing because every other class I have just has regular marks. (RGO. A1. R2)

In summary, survey and interview data revealed that students self-identified a number of positive and negative factors associated with digital badges, and that the

negative outweighed the positive by 53%. The next section will consider other variables that had an indirect influence on student perceptions of digital badges.

1.2 Other Variables Influencing Student Perceptions

This section will consider a number of other variables that influenced student perceptions of digital badges, including student performance, badge design, the quality of written feedback, and tutor perceptions.

1.2.1 Student Performance

The data collected from Phase 4 suggests that the digital badges were more well received, and more motivating, for students that performed better on the course. The most positive data set collected was that of the focus groups, which may have been self-selecting in that way; students completed all three surveys and the focus group because they had a more positive view of the digital badges. This group also tended to perform better in the course; the average overall result for students who participated in all three surveys and the focus group was 81%, compared to the overall average grade of all students on the course of 65%.

One reason that better performing students were also more positive about the digital badges may be that they were less worried about not passing the course, which could reduce some of the anxiety felt by not receiving a numeric grade. Conversely, a student who is unsure as to whether they are passing may be more likely to worry about not receiving a specific grade:

Helping other students in the course to determine whether they passed the subject is incredibly stressful. We're trying to average badges into numbers to try and ascertain whether they will even pass EDUC1038. It's not easy and cause extreme frustration (NRM. A3. R7).

1.2.2 Badge Design

Elements of badge design were also shown to impact upon student perceptions – particularly with respect to misconceptions around the badges that could be awarded

and ambiguity as to which colour the badge was. Even though a badge was not awarded unless a student passed that specific criterion, some students appeared to have a misconception that badges could be awarded for not passing, and that a non-passing badge was dark grey in colour. This created confusion when students mistook silver badges for the non-existent dark grey badge purportedly awarded for not passing that criterion:

Something that I struggled with accessibility and inclusivity wise, the fact that the gold, bronze and silver, and then the failed ones where the exact same colour as the silver. (BHI. FG1. R1)

So online and when it's printed, they're all grey and white. So when I first look at it, I just see it all as either silver or all those as failed. (BHI. FG1. R2)

Yeah, because it seems like it's such a visual thing, it's kind of tricky to make sense of it. And I did hear from other people who were saying, because there was a dark grey or light grey and then a silver and they were, after the first assignment, some people got silver but they thought it was grey so they thought they hadn't passed and they kind of panicked. So I guess that sort of maybe make the colours more different, more contrasted. But I feel like it was mostly kind of navigating it that was tricky, I think. (BHI. FG10. R1)

1.2.3 Written Feedback

Survey data revealed that the quality of the written feedback provided by the tutor also had an impact on student perceptions of digital badges. There were two aspects to this. Firstly it applied to feedback that did not align with the badges themselves

E.g.

It was not helpful at all. It was very vague, saying I did well, and yet when I compared the comment to the digital badges I received, I did not understand why I did not do better in the assignment. (MEF. A1. R2)

Secondly, it related to the amount and quality of written feedback:

E.g.

I think it would be beneficial to offer the personalised feedback at the same time as the digital badges for more comprehensive review to identify areas that need more development (MEF. A1. R10)

I did not have a lot of feedback to review. The marker did not give me

anything to work on in the feedback, just told me I did a good job. (MEF. A1. R13)

Maybe they [the digital badges] would be better if I was receiving more than one word sentences for feedback (MEF. A2. R27)

Definitely would like the badges a lot more if my marker was giving me as much effort into my feedback as I was into the assignment. (MEF. A2. R28)

Specifically, within this category students identified a lack of relevant feedback on what could be improved upon for the next assignment:

Could be more in depth about what I could have improved on (MEF. A1. R4)

I didn't find the feedback very helpful. This is because I don't exactly know where I went wrong and what I can do to improve for next time (MEF. A1. R17)

I didn't get any written feedback which I would have liked so that I could know where I went wrong. So the feedback was not helpful at all. (MEF. A1. R24)

These comments highlight the important function of written feedback alongside digital badges – as badges focus on what has been achieved, the accompanying written feedback must address what still needs to be done. An absence of such feedback substantially undermines the effectiveness of assessment feedback overall. Even though the tutors teaching on this unit were instructed to provide assessment feedback as normal, in some cases, from the point of view of the students, this appeared to be deficient. Interestingly, a number of students attributed the lack of written tutor feedback to the digital badges themselves, even though tutors were not told that badges were a substitute for written feedback:

My biggest suggestion would be to place more focus on individualised written or verbal feedback pertaining to each individual assignment. By adding more systems, the quality and amount of feedback from tutors may suffer if they are under the impression that the badges are doing enough to help students. (MEF. A3. R5)

One of the key points that I have learned throughout this course is the importance of recognising students as individuals. As such, it is extremely disappointing to see that some of the academic staff are content with giving generalised feedback to entire cohorts. This underpins a larger concern that digital badges are simply a way to minimise the effort of markers in providing constructive feedback to students. (MEF. A3. R12)

It is important to note that the negatively coded student comments around written feedback are not intrinsically linked with the badges per se, and ideally could have been avoided had high quality written feedback been provided. Given the prevalence of such comments (MEF:82) it is arguable that at least some of the negative



perceptions held by students towards digital badges were not caused by the badges themselves, but by the lack of adequate written feedback.

Analysis

Discussion and analysis

2.1 The Impact of Digital Badges on Students

The purpose of section two is to analyse the impact that digital badges had on students. Impact differs from perceptions in that perceptions were primarily self-reported (I liked this, I found this helpful, I didn't like that etc), whereas impact has been deduced based on student responses to survey questions. Both positive and negative impacts will be detailed here. This section also includes a discussion on the extent to which these positive and negative effects are attributable to awarding digital badges or could be achieved simply by withholding grades.

2.1.1 Positive

With respect to positive impact the four main factors were active engagement with assignment feedback, increasing self-efficacy, reducing grade anxiety, and student motivation. These will be discussed in turn.

2.1.1a Active Engagement with Assignment Feedback

The primary survey question relevant to positive impact was "please explain the process you went through after getting this assignment back". Active engagement responses were coded for use of the rubric (IR), use of the badge tree (IBT), and conferring with others about interpreting badges (ICO). The number of codes for each category across Assignments 1 and 2 is represented in Table 3.

Table 3: Coding for Active Engagement with Assignment Feedback

| Code | Assignment 1 | Assignment 2 |
|--|--------------|--------------|
| Impact Rubric (IR) | 17 | 11 |
| Impact Badge Tree (IBT) | 6 | 6 |
| Impact Conferring with Others (ICO) | 5 | 0 |

IR refers to active use of badges with the rubric to determine performance on an assessment task. Examples of responses that were coded for use of the rubric (IR) include:

[I] reviewed the badges I got and measured them against the rubric (IR. A1. R6)

After receiving the email that my badges were allocated, I created an account and then proceeded to parallel my achieved badges to the rubric. (IR. A1. R12)

Once I got my assignment back I made sure to have the original marking criteria open as well as my badge backpack. This made it a bit easier to flick back and forth to check what each badge actually meant. (IR. A2. R3)

After getting the assignment back I pulled up my rubric and compared it to my digital badges so I could correctly see what went wrong each section and understand what I did correctly. (IR. A2. R10)

I looked at my badges and tried figuring out what each meant next to the marking criteria to see what they mean. (IR. A1. R8)

In each case students used their digital badges in conjunction with the assignment rubric to deduce their performance on the assignment. Evidence of engagement with the rubric was the most common coding category. The fact that students needed to use the rubric in order to make sense of their badges might suggest that simply using the rubric to indicate the quality of the assignment might be more effective than issuing badges. This is explored in Section 2.1.3.

IBT referred to students who actively used the badge tree provided as a tool to reflect on their results. Examples of comments coded as use of the badge tree (IBT) include:

First I logged into MyEquals to download the badges I had received. Then I downloaded the badge tree and compared my badges to the marking criteria by placing them on the badge tree. (IBT. A1. R1)

After getting the assignment badges back, I placed them on the tree, to understand how well I achieved. (IBT. A1. R3)

I logged on to the MyEquals and placed the badges in the badge tree to estimate if I may receive a HD, H, C or P. (IBT. A2. R5)

After the assignment was returned, I read all comments and was happy with all. I put my badges into my person badge tree where I could compare my results to my last assignment, which I felt there was a positive improvement from my last results. (IBT. A2. R6)

The above comments suggest that the display of badges in a badge tree (Figure 1 in Section 3) provided a useful visual aid and tool that assisted students in interpreting their results. More discussion about how students used the badge tree will be included in Section 3, Recommendation G.

The final category of active engagement, conferring with others (ICO), refers to students who had conversations with others to help determine their results, which can be seen in the comments below:

I referred the badges I received to the original marking rubric and also asked my tutor and peers for assistance in deciphering what my badges meant and what mark this meant for me and if it was a pass (ICO. A1. R1)

I looked at the mark/badges I was given, then asked others in my class what they meant. (ICO. A1. R2)

It is being suggested here that comments across each of these three categories (IR, IBT, ICO) are evidence for active student engagement with assignment feedback as a direct result of receiving digital badges and not receiving marks. Unpacking the relative weighting of each factor (i.e. was it receiving a digital badge, not receiving a mark, or both) will be discussed in section 2.1.3 below.

2.1.1b Reducing Grade Anxiety

Grade anxiety refers to the stress or negative emotion some students experience when receiving a mark for an assignment, whether it be high or low. Following from this, some students in the focus groups (GA: 15) indicated that they found receiving badges instead of grades less stressful:

It felt almost relieving in a little way. Like without having to get the black and white grade, I don't mind grades, but you could look at your badges and you could be like, okay, it's going to be okay. And then you could, I suppose, move on without getting caught up in a number. So you knew that you were fine and you wouldn't fixate on it, I guess. (GA. FG. R2)

Yeah. And like similar to that, it takes away the number and like the percentage. I feel like that is something people focus on straight away is like 80%, 50%, this, this, this, you know what I mean? Whereas this was more okay, well I got a silver one on this one, but bronze in this, you can work hard on that. (GA. FG. R3)

I get very stressed, out very quickly, very anxious. So they ended up being something that I enjoyed receiving. It didn't feel as daunting to open. So it ended positively for me. (GA. FG. R4)

There was a definite mental boost and I know a lot of people I'm friends with at uni have said the same thing. It wasn't as blunt as a grade. (GA. FG. R5)

These findings were both interesting and unexpected, and are not currently well documented in scholarly literature. However, as noted earlier, the students who took part in the focus groups were the ones who performed better on the assignments. In the light of the larger body of students who commented on the lack of grades causing them considerable anxiety (see Section 2.1.2) it seems likely that students who know they are going to pass the course were more likely to find the badges reduced their anxiety, but this was a minority of the overall student body.

2.1.1c Increasing Self-Efficacy

For a small number of students digital badges appeared to boost self-efficacy (SE:6), as not receiving a specific mark appeared to increase some students' awareness of specific achievements within the assignment:

I think it would be really good especially for people in their first year of uni and high school when people get so focused on getting the top mark, and I think digital badges focuses more on what you've achieved rather than the mark you've got. Obviously your marks are important. I think it's really good to have the badges that are saying, "No, you've achieved this," and you can really hone in and focus on what you've done and be like, "I've actually done that. It's really good." But then the positive is it's more achievement-focused rather than numbers-focused. (SE. FG. R3)

So I was actually happy with how I went. My badges really reflected that. And I think if I had maybe looked the marks up, I was unhappy with that... Because I got a gold badge... But I think if I looked at those marks, I'd have been like, "Oh, I was four marks off, four marks" kind of thing. And then those badge I feel a lot happier about, especially my first assignment, because it was my first assignment in my whole entire degree. I don't think I've ever been more excited about getting marks back, because I was so happy with how I'd done on my first assignment. (SE. FG. R4)

This coding category is similar to reducing grade anxiety (GA:15), but also distinct in that rather than feeling less anxious for not receiving a grade, they felt 'more able' by seeing clearly what they had achieved. Again, this feedback came from students who achieved very high grades on the assignments – so is not typical.

2.1.1d Student Motivation

Consistent with existing research on the impact of digital badges (Hamari, 2017) there was evidence to suggest that digital badges had a positive impact on student enjoyment and motivation (coded primarily as GE):

It definitely made that whole process a lot more exciting. I was able to, and it was, I found within the students, especially in the class and extended to outside the class and we were all kind of like, "Oh, look, I got the like..." It was a thing, not just a grade. So that really did make the process a lot more enjoyable. (GE. FG1. R1)

The whole process really did outline my own learning style, as well. So being able to identify how I did things on linking it between the assignments. But definitely, I found that I was a lot more engaging, especially between peers, but also for myself. I was actually excited for the grades. I was able to interact with the process. I was able to go through the rubric can be like, "Oh, I got the..." I find that majority of new year students are giant kids. They enjoy the novelty of it while still being very, very accessible and inclusive. And yeah...(GE. FG1. R2)

It's like a medal at a sports carnival. That's what I see it as. It's a fun way to share the grades, I guess. And we all had the exact same opportunity. It wasn't, "Oh, this is the athletic kid who's going to get gold." It was, we all had the same opportunity to access the gold. Majority of us were at gold and silvers, so we all got to share that enjoyment. We all got to participate and talk and it's built some amazing friendships and interactions. (GE. FG1. R3)

I probably said that a hundred times. I really did enjoy it. It was very engaging. I was able to engage with the process a lot more. (GE. FG1. R5)

That's more like little gold stars on your way to success. It's just exciting because it's like, "Oh it's a badge. It's not like, 17 out of 20. 17 out of whatever." It's exciting to look forward to. It's like, "Did I get gold, did I get silver? I'm aiming for gold." (GE. FG1. R7)

As can be seen, the novelty and enjoyment of receiving digital badges appeared to have a positive effect on student motivation, though it must be noted that the majority of the detailed comments showing increased motivation came from the focus group

interviews, which tended to consist of students who performed well on the course – they received an average mark of 81% versus the average course mark of 65% – and tended to have a more positive view of the badges than the average survey participant.

The findings presented in this section, and particularly those around self-efficacy and motivation, are consistent with existing research on the awarding of badges.

Specifically, Hamari (2017), in outlining the positive effects of badging, identifies **motivating social comparisons** (*It definitely made that whole process a lot more exciting. I was able to, and it was, I found within the students, especially in the class and extended to outside the class and we were all kind of like, "Oh, look, I got the like..." It was a thing, not just a grade. GE. FG1. R1*), **social proof**, (*It's like a medal at a sports carnival. That's what I see it as. It's a fun way to share the grades, I guess. GE. FG1. R3*) and **anchoring performance expectations higher** (*I think it's really good to have the badges that are saying, "No, you've achieved this," and you can really hone in and focus on what you've done and be like, "I've actually done that. It's really good." SE.FG4.R3*).

An interesting feature of the data presented in this section is that students who subjectively perceived aspects of the badging process negatively may have also been positively impacted by their implementation through more active engagement with assignment feedback. For example, the student below found the experience of checking the rubric carefully more stressful, but also acknowledged that they benefitted from going through that process:

[It] was probably useful spending more time on the rubric, even though I might have found it a bit stressed trying to figure it out. It made me kind of reflect on my work a little bit more. So I think before I submitted it, I was like, "Okay, I really want to get this badge. What I have to do," kind of thing. And then when I got those badges, I kind of had to go check what the badge was for, and then read what I actually achieved during that badge. I check my assignments to see what I had done. So I was checking it a lot more than usual. So I think it helped me improve with my next few assignments in this course. So I thought that was really helpful. (ME. FG. R3)

In summary, four positive impacts of digital badges primarily on high achieving students were identified in the current study. While several of the positive impacts that digital badges had have been identified in research, including increased engagement with feedback, motivation and self-efficacy, a new category, reducing grade anxiety, has not (to our knowledge). Further investigation of this particular benefit warrants additional attention.

2.1.2 Negative

With respect to negative impact of badges in the current study, the primary factor was the increased level of assignment stress students reported as a result of not being given numerical grades and finding badges hard to interpret. As outlined earlier, uncertainty due to lack of a mark (NRM: 83) was the second most populous coding category overall, and proved to be a major source of angst amongst students:

Not helpful at all. I am stressing about what my numbered grade is. The badge is not helpful (NRM. A1. R25)

I found the badges extremely unhelpful and created much more stress than necessary across most students. I wish that there would be numbers plus badges in the future to assist everyone (NRM. A2. R3)

After getting my badges for the second assessment I have no idea what mark I need to pass the course which puts extra stress on me in a time where there is already plenty of stress on me. (NRM. A2. R6)

Unnecessary Stress. The digital badges do not provide a numerical grade for students. This ensures that students are in the dark with how they are progressing in the course in terms of whether they are passing or not. (NRM. A2. R7)

Not having physical scores on the first and second assignment didn't really bother me until the end of semester when I couldn't tally up my marks. It caused quite a lot of stress. (NRM. A2. R6)

Similarly, students who found the badges difficult to interpret also experienced additional stress:

It was slightly stressful not knowing how to navigate the website. It was difficult to read the badges as the section which tells you what the badge is for is hard to get to as you have to click to get to it. Also, the yellow colour is not a very strong gold colour, which creates stress. I was worried because I thought, "What does yellow mean?". Also the badges are small on the screen and hard to read (BHI. A1. R12)

The badges were very hard to interpret if I had passed or not (BHI. A2. R12)

The word 'stress' appeared 54 times in student responses across surveys and focus groups, and the general anxiety felt by students who did not know their specific grade (NRM: 83) and felt unable to infer it using badges (BHI:67) and feedback (MEF:82) was one of the major trends in the data collected in this study. This is more representative of the reactions of students as a whole than the positive findings reported above.

Though it can be shown that badges did have some substantial (and surprising) positive effects on some students such as increasing engagement with feedback (ME:53) and reducing grade anxiety (GA:15), the overall impact of introducing badges and withholding grades in this study was negative due to the anxiety caused by uncertainty around marks (NRM: 83). Strategies that can be put in place to mitigate this issue will be considered in detail in the project recommendations.

2.1.3 Badges versus Withholding Grades

An important question that arose during the course of the research was whether it was the digital badges that were responsible for the positive and negative impacts on students, or the withholding of grades. Some light was shed upon this when it proved

impossible to award badges for Assignment 3 and in the follow-up study undertaken in semester two (Phase 6) where grades were withheld but badges were not awarded. Specifically, Phase 6 interview data suggested that some of the negative effects observed in Phase 4 (student anxiety) may be attributable to the badges rather than the withholding of grades, and, conversely, some of the beneficial effects observed in Phase 4 (reduction in grade anxiety) may be attributable to the withholding of grades rather than badges.

For example, when asked whether students responded positively or negatively to the withholding of grades in Phase 6, one tutor (who had taught across both Phases 4 and 6) responded that students were *Neutral. They're not super happy, they're not super sad or upset. No. Neutral, I think. (WG.T1)*. This was supported by data collected from the Phase 6 student interviewees, both of whom felt 'neutral' about the withholding of grades. However, when the tutor was asked about how students responded to the digital badges in semester one they replied: *from my experience, if I compare...my classes...I think when we used badges, they're like a bit more worried...but this semester I never heard, no one make any... they're not worried about, they're just thinking about, "I wish I could see my marks". (WG.T1)*. When asked to elaborate on the differences between the two semesters, the tutor replied:

[in semester 2 – Phase 6] I found that [the students are] more kind of positive in terms of withholding grades, they don't mind. And they can see the feedback, they're happy with that. With [semester 1 – Phase 4] there is like two type of worry. One is "What is the grade I'm getting and what is my marks? I don't know the marks", and another worry among the students was like, "I don't understand the badge". (WG.T1)

The tutor's comments suggest that at least some of the anxiety experienced by students in Phase 4 may be a result of their difficulty in interpreting the digital badges ("I don't understand the badge"- WG.T1) rather than not receiving a mark. The tutor also made the interesting point that the digital badges may be adding to the student's uncertainty rather than reducing it:

So there is two things going on in their mind. That "I can't see my marks. Did I pass?", and "What does this badge mean? What is the benefit of using this badge? Is it something I need to carry on throughout this degree or is it something if I don't get that golden badge or silver badge, what happens...What will happen?"(WG.T1)

Here the tutor suggests that the difficulty in interpreting the digital badges adds an additional element of uncertainty to the results on top of not receiving a mark. This reflects the comments noted earlier about the extent to which students referred to the rubric in order to make sense of the badges (Section 2.1.1a). Both the evidence from Assignment 3 and Phase 6, and logic suggest that simply marking how students have done on the rubric is clearer than providing a badge which indicates how they have done against the rubric.

Evidence also emerged that the uncertainty around interpreting digital badges may have also had a negative effect on tutor workload due to the number of questions asked by students:

I remember that last semester when students were getting the badges, next class, like half of the time probably, I was trying to help them understand. [there were] so many questions regarding these badges. But this semester, as we didn't use any badges, there were like no questions except a few questions regarding the feedback. (WG.T1)

Evidence from tutor interviews in Phase 6 also suggested that some of the benefits observed in Phase 4 (i.e. the reduction in grade anxiety) may also be attributable to withholding grades (but not awarding badges):

When someone is getting bad [marks], especially...not for the good student...they feel like very demotivated in between the semesters when they're getting the first grades for the first assignments. And in this course [Phase 6], as we don't have any grades during the classes or during the semester, I found them very enthusiastic during the classwork and all these things. Obviously it impact[s] those who are not getting good grades. (WG.T1)

This was supported by student data collected in Phase 6, as this student comments:

You just engage more with the course in that way, instead of just focusing on a certain mark. You're just looking at trying to learn what you can in the course. So just trying to focus, "Oh, I need to get this mark regardless of whatever." I think it's a good way to just be more immersed in the course without the grades. (WG.S1)

Interestingly, the comments made by the tutor contrast with the findings on student performance considered earlier (section 1.2.1), which suggested that it was the better performing students that benefitted the most from receiving badges and withholding grades.

Despite the fact that the course size in Phase 6 was smaller (72 students) than in Phase 4 an important caveat to be mindful of when looking at this data is the sample size, which consisted of only two student interviews and one tutor interview, making it difficult to fully delineate the effects of badges and withholding grades. Another factor making it difficult is that much of the evidence from Phase 4 suggests either a combined effect or an effect different from that described in Phase 6. For example, the student below attributes the reduction in anxiety to both the lack of a mark and the badge:

It felt almost relieving in a little way. Like without having to get the black and white grade, I don't mind grades, but you could look at your badges and you could be like, okay, it's going to be okay. And then you could, I suppose, move on without getting caught up in a number. So you knew that you were fine and you wouldn't fixate on it, I guess. (GA. FG1. R2)

Similarly, the student below attributes their anxiety to not having a mark and does not mention badges:

Not having physical scores on the first and second assignment didn't really bother me until the end of semester when I couldn't tally up my marks. It caused quite a lot of stress. (NRM. A2. R6)

There appeared to be a number of positive factors, such as motivation (considered in section 2.1.1d) and self-efficacy (considered in section 2.1.1c) that are more clearly linked to specific features of the badges. It is also arguable that the increased engagement with assignment feedback may be a result of students seeking to interpret the badge. For example, both students interviewed in Phase 6 did not report engaging with feedback any more or less than in courses where grades were awarded:

Interviewer: *And did getting, or withholding the grade, in say 1038, withholding grades and stuff, did that change the way you prepared for assignments, or approached them?*

Student: *So for me, not really, because I don't try, and I don't have a specific mark in mind. (WG.S1)*

Interviewer: *And thinking now, 1038, did you prepare for the assignments in the same way that you would normally do, or was there any difference?*

Student: *No...It hasn't really been any difference, just the same. (WG.S2)*

In contrast to this, many students in Phase 4 indicated that they did engage with the rubric more rigorously in an effort to interpret the digital badge (as considered in section 2.1.1a).

In summary, the Phase 6 data raises some interesting questions about the relative effects of digital badges and withholding grades, and while it may not be possible to fully delineate the impacts in the current study due to the small sample in Phase 6 and the ambiguity in some of the comments from Phase 4. However, the available data does suggest that at least for some students, withholding grades alone may have had a more positive impact than replacing grades with digital badges.

2.2 Tutor Data

In total, eight (8) tutors /markers were interviewed as part of the research. This represents a 47% participation rate (out of the 17 possible participants). One (1) participant (TM7) was a marker only, two (2) (TM1 and TM3) were tutors only, leaving the remaining five (5) as having both marked and taught in the Semester 1 offering of Intro To Ed. Included here are responses and statements from interviewees regarding how *the tutors and markers* experienced the digital badges in their roles rather than their perception of the *students'* experiences of the digital badges. In particular, attention is paid to the marking experience, the applicability of digital badges across courses, and the connection of digital badges to the Australian Professional Standards for Teachers. Four major themes and one theme related to tutor experience of badges emerged from the tutor interviews. They are each reported below.

A. Additional workload burden through marking

It was identified by a number of markers that there was an increase in workload due to the introduction of the digital badges, while at the same time maintaining the University's requirements of assigning a numerical mark to each assessment task. Having a clearly outlined rubric, which had juxtaposed on it the bands of the SOLO taxonomy did alleviate some of this burden. As TM2 pointed out, this wasn't "difficult" but rather "time consuming", responding to the interviewer by saying:

As after giving the badges, we need to provide a marking to the course coordinators. That is a little bit of time consuming to go through the rubric with the marks and find out what is the mark is time consuming, not difficult? I should not say it's a difficult one. It's easy one, but you need some extra time to complete when we are... So first we do the badging, we are just providing some complete and with the students, the badging, but later in one of two days we provide the marking.

This was an important factor for TM2 as she repeated this comment later in the interview, saying:

It's not actually negative. For staff, it's just time consuming because you have to give the badges first, but the university still rely on the marks, so you have to transfer the badges to the marks. That's the time consuming part. It's not negative, but it's just time consuming. (TM2)

The additional workload may also be because using digital badges was new for participants in terms of marking and also in familiarity with digital badges broadly speaking, as only three participants (TM4, TM3, and TM2) had experience or had heard of digital badges (see the anomaly theme for further information). It seemed that those participants who were confident in using new technologies themselves displayed a more positive attitude to the digital badges project more broadly (TM8 and TM7). This is not age connected nor connected to experience teaching at the university, as both these staff have 5+ years working at the university as a tutor/marker and 20+ years in the field of education. This demonstrates a need to ensure that staff employed are comfortable with change, especially technological change, and are supported through ongoing professional development to adapt to change.

B. Additional stress created by factors such as confusion of the new system

A number of participants (TM5, TM1, TM6) reported additional stress brought about by the confusion of using this new system—which has not been used in other courses at the University. This seemed to be exacerbated due to the digital badges being piloted with first year, first semester students. By this, tutors already have to support students in additional ways that don't need to occur in second semester first year or second, third, or fourth year by way of introducing them to University systems and learning at a tertiary level—and then an additional layer of digital badges was added to this. Even though information about the badges was covered by the staff involved in the research (the two course coordinators and the research fellow) through weekly Q&A sessions, videos, and tutorial visits), it did spill over—as might

be expected—into class time. This disruption and additional stress that some participants reported, could potentially have been mitigated as TM5 said, *I did wonder if maybe it would've been useful for a bit more time maybe to be spent at the start of the course, just explaining the graduate teaching standards and taking them through that as sort of at the beginning of the process.* The difference between university study and school was something TM5 also brought up, saying:

...they certainly seem...to be aware and seem to know where they're heading, what they've got to sort of achieve. By the end, I think there's always going to be some that are going to find that a bit overwhelming, but that's also part of that I think starting university and most of them who are straight out of school. I think they're all, even some of the mature age ones I had in the room were still getting their head around how things work and- And what it all means...

For TM1, students being in their first year was a repeated, contributing factor to her believing that the students had a negative reaction to the badges, for example, she said:

I did have a few students with the first assignment saying that they found it really difficult because it's the first time they had to go and get their badges and marry them up with where those badges were. And they weren't particularly happy that they had to do that. They would've liked to see it streamlined so that they knew where it was...They've grown up in a system that's incredibly competitive with marks and the ATAR and all of that. And they've gone from there to this first-time university experience where they're getting badges, which are a little bit more difficult to read... I did have one student who'd gone, "I love it." She said she'd done a bit of work on SOLO taxonomy. And she was kind of like, "This is a really good way to go..."But I did get the impression that it was that... People

don't like change. And these students have grown up in this incredibly competitive, extrinsically motivated way of learning. So I think it had a bit to do with that.

It should be pointed out that TM1 also reported a negative experience teaching into the course and being stressed by a number of aspects to do with the course such as coursework and communications with the course coordinators (outside of the digital badges research) which may have also contributed to this negativity that was then also felt by her students (as reported by TM1).

TM6 struggled 'translating' between the digital badges and the rubric's use of the solo taxonomy. This indicates that more comprehensive professional development may be needed in this area—but also noting TM6 is the only interviewee to have brought this up. Her response to the question, "Did the use of digital badges have an impact on the marketing process at all?" reads:

So I was always scanning so many documents just to make sure you got it right. And then obviously you write comments, you write a mark, and it was cumbersome, I've got to say. Really cumbersome. And look, I'm okay. I'm pretty easy on adaptations and things, but it still was really, really exhausting. And you had to pay attention because it was very easy to get it wrong. Because there's so many moving parts to it. So that, as a marker, I would just say it made the process extremely long and unwieldy. And I understand why, because they're trying to get marks to equate to HDCs and credits and passes...and give the students the traditional mark. However, they were also trying to do the badge thing as well. So it was heavy. It was heavy duty.

TM5 also discusses the extra workload and additional payment, over and above what is usually paid for marking student assignments, saying, "...the marking took longer because there was the extra step in the process, but that was well and truly covered in the time that they allocated. So it's fine." TM6 also said that as a first-time

tutor on this course, the additional workload was significant, saying, *“People have lives, workloads, and to engage with this extra component probably was just...a little bit unwieldy perhaps at this point.”* This possibly speaks to the need to have better targeted professional development, and ongoing support for tutors and markers who are new to the course. This is different to Theme 1 whereby additional workload was reported; this theme addresses the additional stress created for some participants through the use of digital badges.

C. Supporting student engagement with the GTS

This theme looks at how the tutors and markers think the assessment connects to the Australian Professional Standards for Teachers (standards), required for the accreditation of the program, rather than how they thought or consider how the students themselves interacted with the assessment and standards. Many participants (n =6) commented on the standards. The overall feeling was that the digital badges *“connected to the teaching standards”* (TM2), that *“the students generally demonstrated that they understood that link...They were really quite confident in using the teaching stems for the level that they’re at. And compared with last year, I think the students were more focused, and I certainly think that that link with the teaching standards was more apparent for the students”* (TM7). Another participant, TM5, thought the focus on badges supported students to engage with the standards and to follow their own progression, saying:

“Because it’s another thing where they’re sort of saying, “Look, you’ve got to tick these boxes. You’ve got to get these badges.” And that sort of thing. And if that increases their awareness and gets them a bit better organised and thinking more deeply about what the journey means and where they’re headed, I think that’s good...I think it’s a really concrete way for them to see where they’re heading as far as the graduate teaching standards and the NTPA [graduate portfolio] as well.

Students *“all seemed quite engaged with it”* (TM5) was supported also by TM4 who said students:

had more attention to it [standards]. They can see a clearer link to that. It has been made more, can I say more outstanding? They can see it is more important and more clearly linked to what we are doing in this course...from my observation in class. When they ask me the question related to the assignment and the professional standards, and also from my marking they can see that they pay more attention to show their work in relation to that.

However, TM5 did go on to say that “... *they were more engaged this year with the standards, and it may well have come through the badges because of the feedback they were getting from the badges as well. And also they were built into the assignments more. So that was important, they had to engage with standards more, the actual course required them to...*” Here, the assessment task and rubric drove the focus of the students which may sit outside the digital badges per se, but certainly influenced the students to pay particular attention to the standards.

D. Needs to be across courses for real impact

There was a strong sense, as reported by seven of the participants, that the digital badges needed to be across all courses in the Bachelor of Education degree program for them to have real impact. They consistently pointed out that with it only being in one course, rather than either cross-Faculty (College) or cross-University, there is less likelihood for students to see the real-world connection to the standards and how it might help them understand what they need to do to achieve success. Applied across other courses will also help, as TM3 pointed out, for students to see the long-term benefit of the digital badges initiated in this course and that otherwise “*it's hard to see where it's going.*” The usefulness of digital badges mapped to the standards relies on other courses to be involved for its long term success. This sentiment is supported by TM2 who mentions that first year students “*are still trying to understand what are those standards and why those are important...when they will complete their first year from in second year teaching students, they'll understand better why it is important and how it is important.*” And instead of being a benefit, only using it one course is not helping, saying “*if you could introduce it to other courses, then it will give more understanding to the students. "Okay, that's how you are progressing. So in your first semester, first year courses, you've got these*

badges. In second year courses, you've got these badges, which means..." So these are the competencies or skills you are getting throughout this degree. Yeah, we should use more badges to other courses as well, not only in one course."

E. Tutor/marker experience with digital badges

An anomaly theme emerged with three participants: TM4 who had experience with using digital badges as a student (at another institution); TM3 who was aware of them through various digital programs; and TM2 through using them in video games. These three participants had a generally positive perspective of using digital badges, and this may be reflective of their own experiences in being technologically innovative themselves or being comfortable with technological innovations and the idea of doing things differently. TM4 most succinctly described this as,

I've been doing some other courses for example, some Microsoft development, professional development, like the digital skills or certified technology, certified something, doc educator. I did it last year and they had the badge system and I've got some digital badges for my achievement when I completed a course.

Playing games, some of the online games I'm used to playing. I was a student a long time ago. About 2015-2016, and they have some kind of badges system, as well, with the skills, achievements, and things. That is my, I think my experience with the badges.

Conclusions

In summary, many of the themes that emerged from the tutor data were analogous to those of the student data, including the stress associated with learning a new system, the interpretation of badges, increased engagement with the GTs, and the desire to see badges across more than one unit. Tutor specific themes, such as increased administrative workload, were consistent across all phases (see Implementation Report A Section 2 for more details).

Recommendations

The final element of the findings being reported here consist of seven recommendations for future practice based on the lessons learned in the current study.

A. If you are going to use badges then remove marks altogether

Only use digital badges where they replace marks – not in contexts where marks will ultimately be used as the measure of student performance.

Existing research suggests that when presented with marks or grades on assignments students often do not look at other feedback (Gibbs & Simpson, 2005; Wotjas, 1998), and there was evidence to support this finding in the current study:

I enjoy the game-like gratification it provides as you have to find and discover your mark. It prompts self-reflection more than an instant mark and feedback. It encouraged me to value the feedback more (ME. A1. R4)

I found the digital badges helpful in giving me specific parts of my work to improve on, rather than just the general mark which would normally be all I checked. (ME. A1. R1)

The feedback was extremely helpful as I typically don't look at feedback however not having a physical score did encourage me to look at the feedback. (ME. A2. R1)

The badges are a good idea and make me reflect on my work more than I usually would (ME. A2. R5)

But when we received them for feedback, I did like the idea how we had to go into them, and look at each badge and find on the rubric ourselves, and read what we've actually gotten. I found sometimes I skipped that, I'd just go, "Oh yeah, I've got this mark, this mark, this mark. But that made us really break

down our criteria, our end result, which I did like the idea of that. (ME. FG3. R1)

Well, I did really like that it was something different because in school you always get a physical mark and that's just it. And I tend to have a bad habit of just looking at the mark and then paying no attention to anything else.

Whereas obviously the badges kind of tell you what you did well and what you need to improve on as you look at them. (ME. FG7. R3)

Greater engagement with assignment feedback (ME:53) was the second highest positive coding category, and many students indicated that the absence of a grade and the presence of a digital badge led to a greater engagement with assignment feedback – with some students indicating (above) that they normally would not look at feedback at all.

However, it was also evident that the absence of grades was a source of anxiety for many (NRM:83). The reason for this may have been that, while grades were withheld, they were not removed altogether. Student work in both the current unit and other units they were completing concurrently ultimately resulted in a numerical grade, as the following student comment illustrates:

I feel like the badges are to reduce the emphasis given on marks, the badges are to encourage us to work towards outcomes not a number. However as long as our subject comes down to a mark at the end of semester I feel like I can't really not be fixated on a mark. That mark at the end of semester is going to tell me whether I earned a HD or whether I earned a fail grade. Everything rides on that mark. So as long as everything rides on that mark, I feel like I can't get past the fixation on marks. Helping other students in the course to determine whether they passed the subject is incredibly stressfull. We're trying to average badges into numbers to try and ascertain whether they will even pass EDUC1038. It's not easy and cause extreme frustration. (RGO. A3. R1)

Yes it would be great to see that I earned a badge in critical thinking, or essay structures, or how to make a sandwich, whatever the situation, but when we are trying to get through university to get our degree, where at the end of the day our priority is our grade and whether we get a pass, credit, distinction, or high distinction, badges are irrelevant, and an inconvenience when we just want to know where we are sitting in our course. (RGO. A1. R3)

As these students indicated, withholding numeric grades in a unit that culminates in a numeric grade led to anxiety that, for many, outweighed any benefit brought about by greater reflection on feedback (see the discussion in section 2.1.2 above). These findings suggest that for the benefits of using digital badges to be maximised, grades ought to be removed altogether.

B. If you cannot remove marks altogether then avoid using Level 3 digital badges

In circumstances where marks will ultimately be awarded and used as the basis for recording student performance then using Level 3 badges (i.e. badges at the level of criteria in a rubric) is probably counter-productive for most students. The exception to this may be for high-performing students, who may find being awarded badges is motivating and reduces grade anxiety.

Withholding marks until students have looked at their feedback, which ideally should include marking up how they have performed against the rubric with high quality written/oral feedback (see Recommendation C) seems to improve student engagement with the feedback, whilst being less stressful than trying to interpret Level 3 badges.

C. Badges are not a substitute for high-quality written feedback

In the context of a university course if level three digital badges are going to be used at all then they ought to complement written feedback, not replace it. Evidence from student survey responses and interviews suggests that when digital badges support written feedback they function to enhance the overall student experience:

I found it somewhat helpful, this is as for some sections in which I did not receive a gold badge I was given clear reasons for the silver badge and told clearly how to improve (GQF. A1. R2)

Honestly, I did actually find more feedback during the course with the badges. That's one thing I did find there was more feedback. (GQF. FG7. R1)

The feedback on this assignment was great, after the first assessment task for the unit and having the badges explained through tutorials, Q and A sessions and explanatory videos allowed for clear understanding. Also, the written feedback I received this time was more of an individual critique rather than a copy and past one where just the student's name is changed. (GQF. A2. R14)

However, when badges are awarded in the absence of any written feedback, or where the feedback is not clearly aligned with the badges, the experience is primarily negative:

I think the use of the digital badges would be successful if certain changes were made for the future. For example written feedback provided with the badges. (MEF. A1. R20)

I have no feedback so it is all unhelpful! The badges are a stock standard response on what that badge means. Which component of the rubrics I fulfilled, however it does not tell me if I am at the top end of that badge, or just scraped in. It is not personalised to me so is technically irrelevant. I have received no feedback in canvas that I can locate specific to me. (MEF. A1. R25)

the feedback did not explicitly explain why I got a silver badge instead of a gold badge for the assignment. I feel it would be more convenient for students to go back to a conventional marking system with proper feedback. (MEF. A2. R1)

if you are giving badges for individual criteria you need feedback for each individual micro credential (MEF. A2. R2)

The only thing I would say is like attaching perhaps a specific portion of the feedback, putting written feedback and notes from the markers with the badges, like having a more succinct connection between the two. Because for me it felt very like, here's the feedback section and then here's the badges. They were kind of not intertwining, which is fine. That's totally fine because I appreciate having both, but I think you could make them a little bit more intertwined. And I think that would also help people make sense of them a little bit more because a lot of people kind of disregarded them as such because like, well, I'm not getting a mark, but I have feedback. So I can just kind of go off the feedback and kind of leave those behind. Whereas having them with the designated feedback kind of makes them make sense a bit more. (MEF. FG2. R1)

As was seen, badges combined with written feedback can enhance the meaningfulness of that feedback. Conversely, badges awarded without written feedback, or where the feedback does not align with the badges, diminishes the perceived utility of the badge. As such, the evidence presented here suggests that if using level three digital badges then they ought to be paired with personalised

feedback to maximise their effectiveness within a unit of study. The feedback ought to indicate what a student could do to enhance their performance.

D. Invest in appropriate software infrastructure

The badge awarding and receiving process should be integrated and seamless within the LMS.

This integration was not possible in the current study due to technical constraints in the LMS (Canvas) and lack of integration with the badging platform (My eQuals). The lack of integration had effects on both the awarding (for staff) and receiving of digital badges (for students). In terms of awarding badges the lack of integration into Canvas had a negative impact on staff workloads and increased the risk of human error when recording student performance:

[for] the staff it caused...a lot of extra work...because of the awarding process, because the systems.

...

[the awarding process] added additional risks because you're doing a lot of manual processing of the data outside of canvas.... It provides opportunities for you to make errors, which means that, for example, you might, issue the wrong badge to a student. (SP.T1)

In terms of receiving badges, having feedback spread across multiple platforms was a barrier for students and negatively influenced student perceptions of digital badges (LMS: 10), as the comments below illustrate:

having one feedback system and badges in that one feedback system would make more sense opposed to having to go to several different sites for one feedback (LMS. A1. R1)

I think it would be easier if there was more information on the badges website so it's all in one place (LMS. A2. R1)

E. Developing a badge framework is important for both students and teaching staff

If using digital badges it is important to adopt clear and relevant frameworks for the awarding of those badges.

In the current study using the Graduate Teaching Standards provided clear links for students between the work they were doing within university and the standards they

would be expected to meet as teachers upon graduation, as these comments illustrate:

They forced me to look back over the standards. I would read some of the criteria and then I'd be like, "Oh, where does that relate to?" And I'd go back and have a little look at the standards, see where it's from and where I need to target. (GTS. FG1. R2)

I think some of the strengths is it not just a number, not just something to do with that assignment, but it gives an overall approach of becoming what your degree actually involves. So as you said before, connecting it to the graduate standards. If in other subjects where you just get that number format, I don't know many people that would go out and have a look and compare that to standards and where you want to be in order to finish the course and whatnot. (GTS. FG11. R2)

Yeah, I felt like they linked pretty well because the assignments were very based around the graduate teaching standards and on the badges it had... Each badge had a designated graduate teaching standard. So it's easy to link them together and see what ones you had a good understanding of and which ones you didn't so much. (GTS. FG7. R1)

Yeah, definitely. I think, not without them I wouldn't use the standards, but I think it definitely made me understand the importance of the standards...I think having a link between the work we're doing the assignments we're doing, the feedback we're getting and then what we need to be working on the future, I think it gives a bit of like a broader, long term, more understanding (GTS. FG2. R5)

Another benefit of aligning badges with relevant professional standards frameworks is that it can prompt a rethink of the structure and aims of the assessment tasks:

They were better applied to the standards than I suppose a normal rubric would be, or at least more obviously applied to them. (GTS. FG2. R7)

The process of reworking the assessment tasks in light of the badges brought the assessments more into line with the specific competencies that students would need to demonstrate in their final year of study as well as when seeking teacher accreditation in the workplace, as this comment by one of the teaching staff highlights:

the accreditation document kind of assumes that we are assessing some of the graduate teaching standards and then, when you looked at the rubrics we weren't...[so] by thinking about issuing badges against the graduate teaching standards, it would force both me and other course coordinators to actually make sure that they were actually assessing the students against the graduate teaching standards... And so it might become a vehicle for improving the quality of our provision. (SP.T1)

As such, it was found that aligning badges with the relevant professional practice framework benefitted students by providing links between what they were learning in their course and what they needed to learn in order to qualify, and enhanced the quality of provision by ensuring that the assessments addressed the competencies that needed to be assessed.

F. Students need to know exactly what to expect

Recognise that for many students digital badges are unfamiliar – they are used to being given a grade/mark. So it is important to explain why digital badges are being used and how to interpret them.

A clear understanding of the badging system, processes and symbols was a predictor for positive student perceptions of badges in this study. Conversely, not knowing what to expect led to a significant number of negative codes.

I started off, because they were obviously very confusing at the start. Because it was a new concept, never had it before. I was a bit like, "Oh, I don't want to do this. This is silly. Why would we do this?" But then I came around to it. I was like, "Okay, this is actually quite helpful," because it forces me to actually look at the marks rather than... Oh the badges rather than comments and everything, but yeah. (VCP. FG1. R1)

At first, when our first badges came out I was like, "What is this? Why aren't we just getting a number?" But then as I deepened my understanding of the badges, and how it interlinks it between the rubric, yeah. It was definitely neutral to positive by the third one, I think. (VCP. FG3. R4)

G. Develop a 'Badge Tree'

Having a badge tree is important because it helps students to see what badges are available and to track their process.

The use of a badge tree (see Figure 1) in the current study had a positive impact on students (as discussed in section 2.1.1a) who used it as a tool to reflect on their performance, and a number commented upon how they utilised the badge tree, which included making sense of individual badges within an assignment, reflecting upon assignment feedback, comparing their results across assignments, and tracking improvements:

I found the digital badges understandable, using the badge tree. I find them successful in replacing numbers (GP. A1. R1)

But then also with having the, I don't know what it's called, but the little thing where you put all your little badges in, I think being able to go back to the second assignment and say, oh, well, like that's actually really good because last time yeah, I got a bronze badge, but now I've got a silver badge and like that's really impressive, but yeah. (MEF. FG2. R2)

Because I play a lot of video games and I really wanted those achievements and achievements. So, putting them all on the tree, they were really great. (GP. FG9. R1)

Figure 1: Badge Tree

| | Academic Understanding | | | | | | | Academic Literacy | | | Self-assessment | |
|--------------|-------------------------|-------------------------|-------------------------|------------------------|------------------------|------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|
| | 1.1 | 1.3 | 6.1 | I4 | R6 | R7 | R10 | C2 | I2 | P7 | 5.1 | |
| Assignment 1 | | | | | | | | | | | | |
| | | IntroToEd-A1 / GTS 1.3a | IntroToEd-A1 / GTS 6.1a | | | | IntroToEd-A1 / TCF R10b | IntroToEd-A1 / TCF C2a | | IntroToEd-A1 / TCF I2a | IntroToEd-A1 / TCF P7a | IntroToEd-A1 / GTS 5.1a |
| Assignment 2 | | | | | | | | | | | | |
| | | IntroToEd-A2 / GTS 1.3b | | | IntroToEd-A2 / TCF R6b | | IntroToEd-A2 / TCF R10c | IntroToEd-A2 / TCF C2a | | IntroToEd-A2 / TCF I2b | IntroToEd-A2 / TCF P7a | IntroToEd-A2 / GTS 5.1a |
| Assignment 3 | | | | | | | | | | | | |
| | IntroToEd-A3 / GTS 1.1a | | IntroToEd-A3 / GTS 6.1b | IntroToEd-A3 / TCF I4a | | IntroToEd-A3 / TCF R7a | | IntroToEd-A3 / TCF C2a | IntroToEd-A3 / TCF C2b | IntroToEd-A3 / TCF I2c | | IntroToEd-A3 / GTS 5.1a |

GTS = Graduate Teaching Standards
TCF = The Competency Framework

Conclusion

The findings presented here have shown that the awarding of digital badges has considerable potential to improve the student experience when it comes to engaging with feedback (Section 2.1.1a), linking work in specific assignments to career goals and outcomes (Recommendation 5) and even reducing grade anxiety and increasing student self-efficacy (Section 2.1.1c). However, it was also shown that these benefits can be overshadowed by student anxiety (Section 2.1.2) and dissatisfaction if the badging system is not optimally conceptualised and executed.

Whilst not explicitly stated in the previous analysis it is important to remember that digital badges are credentials. Given the complexity of implementing a digital badging approach one has to question whether it is appropriate or efficient to issue badges which are unlikely to be shared with potential employers.

As with all technologies one has to ask not only if deploying the technology will be effective, but whether it will be the most effective way to achieve the desired outcomes. If the desired outcome is to enhance student engagement with feedback on assignments then using digital badges may not be the optimal approach – it may be more efficient to simply withhold the mark/grade until after students have demonstrated that they have engaged with the written feedback.

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