Irish Journal of Academic Practice

Volume 6 | Issue 1 Article 1

2017

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Abstract

Many students entering higher education (HE) today have never known life without the internet. By the time students enter HE, many have been exposed to playing digital games and consider them a very useful learning tool. However, utilising gamification for student engagement and student learning in HE has not been investigated thoroughly, and this paper attempts to contribute to this emerging field of study as suggested by Gibson *et al.* (2015) and Reid *et al.* (2015). A survey investigating the usefulness of digital badges for student learning and engagement was distributed to two hundred and fifty-seven (275) undergraduate students at the College of Business, University College Dublin. The results suggest that the incorporation of digital badges into a module is beneficial as they can help students organise their study, maintain and track their progress, and motivate them to engage with module content throughout the semester. The survey results also provide some evidence that digital badges can make a positive contribution to student engagement within a module, particularly where they are directly linked with the module assessment requirements. Overall, digital badges have the potential to be a highly effective pedagogical tool that can also positively impact on the learning experience more generally.

Keywords: digital badges, gamification, student learning, student engagement

Introduction

Debate around gamification in higher education (HE) has gained pace in recent years. Gamification is the concept of applying game mechanics and game design techniques in non-game contexts to achieve higher levels of engagement and to motivate individuals to achieve their goals (Goasduff & Pettey, 2011). Gamification "is about discovering extrinsic and intrinsic motivators that can make learning more engaging" (Dicheva *et al*., 2014, p.1) and it has the potential to enhance levels of both motivation and engagement among students (Simões *et al*., 2012). Gamification represents a means of recognising tasks achieved by students and allows for quick feedback to be provided on progress made (Kapp, 2012). Hamari (2017) suggests that completion of goals leads to increased student satisfaction and increased student performance, especially if goals are context-related, immediate, and the users are provided with instant feedback.

The use of digital badges is one example of gamification in HE. Digital badges are "online representations of learning experiences and activities that tell a story about the learner's education and skills" (Gamrat *et al*., 2014, p.1136). They are typically used in HE for a variety of purposes, including to recognise a student's participation in a learning activity, to help them explicitly and visually capture progress made on learning tasks, to recognise the achievement of skills and competencies, and to serve as a means of certifying these achievements. Digital badges can help guide user behaviour as they set clear goals. Hamari & Eranti (2011) argue that badges function as a guidance mechanism in a service, providing the user with an idea of how the service is intended to be used and what is expected of the user, thus increasing the amount and quality of those actions within a service.

Much of the research to-date focuses on what digital badges are and what they are used for (Casilli & Hickey, 2016; Finkelstein *et al*., 2013; Gibson *et al*., 2015; Law, 2015; McDaniel & Fanfarelli, 2016), and their potential benefits from a student learning, engagement, tracking of progress, motivation and retention perspective (Casilli & Hickey, 2016; Jovanovic & Devedzic, 2015; McDaniel & Fanfarelli, 2016; Saxton, 2015). While the literature does give some insight into the potential application of digital badges in HE, these studies can sometimes unintentionally present digital badges as relatively complex technology tools which can be off-putting for lecturers who might be considering their usage for the first time. This paper reports on a very simple, yet effective, way in which University College Dublin's (UCD) College of Business has made use of digital badges to improve student engagement. Furthermore, the digital badge end user's experience or perspectives on their value is rarely reported upon in the literature, and this paper is an attempt to give students some voice in this regard.

The paper will begin with an overview of digital badges in HE, including their merits from a learning and student engagement viewpoint, followed by some examples of their use in international and Irish HE contexts. Some practical considerations to be taken into account when implementing digital badges are then discussed before details of the study undertaken at UCD College of Business and the results are presented.

Digital Badges in HE - An Overview

One of the core principles of adult learning suggests that adults are self-directed in their learning endeavours (Knowles *et al.*, 2011). Higher education has also become much more outcomes-based in recent years and, thus, the awarding of digital badges to students as a means of recognising the achievement of specific knowledge, skills or

competencies represents an area that warrants further exploration. It has also been argued elsewhere that learners need to know how well they are doing on achieving prescribed learning outcomes and be supported in doing so through a conducive learning culture and climate (Brookfield, 1986; Knowles *et al*., 2011; Rogers & Horrocks, 2010; Zemke & Zemke, 1995). Becker & Nicholson (2016) suggest that students must become active learners who are capable of taking ownership of their own learning. Higher education institutions (HEIs) and those responsible for teaching courses at university level must consider how the current generation of university students also referred to as the so-called 'digital natives' might be better supported in terms of taking greater responsibility for monitoring their own progress towards the achievement of key milestones in each course. Today's and future student cohorts have never known life without technology, the internet and - in many cases and more frequently - without social media. The always-on and connected student utilises mobile technologies such as smartphones or tablets daily for both entertainment and study-related activities. Thus, the potential for digital badges to provide learners in HE with instant feedback on progress being made regarding the achievement of learning outcomes or key assessment and learning milestones either sent to the student's mobile device or being available via the institution's virtual learning environment (VLE) warrants investigation, and this paper aims to provide some insight in this regard.

Digital badges are one of several commonly used gaming tools (Bunchball, 2010). However, their use is relatively new in HE and it is a relatively new area of research in general (Law, 2015). Banner *et al.* (2014) note that they were first introduced in 2010 at a conference sponsored by the Mozilla Foundation in Spain. Badges can help to provide employers, for example, with more 'granular details' on skills and

competencies acquired by students and that are not routinely captured on the traditional university transcript (Bowen & Thomas, 2014, p.25). Digital badges are a relatively "new way to capture and communicate what an individual knows and can demonstrate" and they signal to students the extent of progress made (Finkelstein *et al.*, 2013). In other words, digital badges show that a student has learned and achieved something (Gibson *et al*., 2015), and they provide evidence of this learning (Casilli & Hickey, 2016).

Digital badges are used to recognise one's participation in a learning activity (Law, 2015) and to encourage learning, pinpoint progress, increase the time students spend on tasks and to serve as a means of 'credentialing' (McDaniel & Fanfarelli, 2016, p.73). Digital badges also help foster learning experiences that are deep in nature (Cross *et al*., 2014) and they help to 'scaffold' learning activities (Jovanovic & Devedzic, 2015, p.115). Digital badges are not intended to replace existing means of certification, but provide institutions with another way of "tracking individuals'" achievements and progress over time (Jovanovic & Devedzic, 2015, p.118). They also provide another kind of pedagogical device that can present a visual overview of a particular "learning path of content and activities" (Ahn *et al*., 2014, p.5). Badges may also contain information about the student, who awarded the badge, and the work completed that enabled the awarding of the badge (Reid *et al*., 2015). The central features of digital badges include:

> ……the recipient (who earned the achievement), the issuer (the individual or organization taking responsibility for issuing the badge), the badge's criteria and description (what the recipient needed to do or demonstrate to earn the badge), evidence (an authentic representation or connection to the underlying work performed or contribution made to earn the badge), a date (precisely when the badge was awarded), its expiration (when, if ever, the credential bestowed is no longer valid), and a certificate or assertion (a connection to an official form of

> verification vouching for the validity of the award) (Finkelstein *et al*., 2013, p.2).

The increasing availability of technology and "internet connectivity" allows education providers to "observe, record and note achievements and milestones" and such providers are increasingly "seeking ways of presenting data and information on student progress in more visually efficient and appealing ways" (Finkelstein *et al*., 2013, p.3). Indeed, Finkelstein *et al.* (2013, p.11) suggest that digital badges provide education providers with an "ability to visualize overall and incremental progress". Reid *et al.* (2015) propose that badges can be designed and implemented in a variety of ways. For example, students may be given full control over the order in which they complete specific learning activities, or they may be expected to follow a prescribed "learning pathway" (p.380).

Research conducted by Saxton (2015) suggests that, while digital badges serve as a means of motivating students, they do not necessarily yield better learning outcomes for students. Of the students that participated in Saxton's (2015) research, half noted their endorsement of digital badges going forward, while almost thirty percent expressed a "neutral" view (p.55). Reid *et al.* (2015) note the dearth of research on the extent to which they serve as a motivational tool. Indeed, Becker & Nicholson (2016, p.71) suggest that "students who are chasing badges and achievements briefly engage with an activity and then put it aside as they rush towards the next goal".

Digital Badges in HE - Examples

Before moving on present the findings of the study undertaken at UCD, some international and Irish examples of how digital badges are being used in HE are

highlighted here to give the reader a flavour of their potential. Young (2012) notes two examples - the Khan Academy who award a 'Great Listener' badge to those who spend 30 minutes watching educational videos from its collection, and Massachusetts Institute of Technology (MIT) where students can earn a badge by giving "consistently useful answers in discussion forums" (p.49). Wu *et al.* (2015) also report on the use of digital badges at Midwestern University where they are used on an 'Introduction to Educational Technology' module as evidence that students have developed skills in the areas of social media, word processing, spreadsheets and various other technologies. Purdue University has created an application called 'Passport' which allows for badges to be created and awarded to students and for "each digital badge to carry metadata such as who issued the badge, how and when it was earned, and evidence of the students' learning" (Bowen & Thomas, 2014, p.23). One example from Purdue University is their 'Passport to Intercultural Learning' where students can attain badges having completed learning tasks that demonstrate evidence of their "intercultural openness, intercultural curiosity, cultural self-awareness, cultural worldview, intercultural empathy, and intercultural communication" (p.24).

In Ireland, the National Forum for the Enhancement of Teaching and Learning in Higher Education, in collaboration with the HE sector, has recently developed a national recognition series for professional development of HE staff involved in teaching. This open-access series involves the implementation of a digital badging system to recognise individuals committed to ongoing professional development in the area of teaching and learning. Fifteen open-access professional development programmes, including programmes on reflective practice in teaching, programme-focused assessment, programme design and teaching strategies for new lecturers have been created, and

these are accompanied by digital badges designed around nationally agreed criteria. Other Irish examples include the 'Student Connect Digital Badge' for volunteer mentors at NUI Galway, and the badges awarded to staff by the Department of Technology Enhanced Learning at Cork Institute of Technology for completion of educational technology training.

Implementing Digital Badges - Practical Considerations

From a practical perspective, the implementation of digital badges in HE requires careful deliberation. While our discussion here of some practical implementation issues is not intended to be exhaustive, it is worth drawing attention to several important considerations. In designing and implementing badges, Wright & O'Shea (2014) suggest the need to consider who will issue the badge, the name and description of the badge, the audience the badge is aimed at, the learning outcomes and activities, the evidence students will need to provide before the badge can be awarded, and the criteria to be applied when assessing achievement. In essence, educators need to consider "what are the achievements in a specific case, what to badge/reward, under what conditions, and, most importantly, how to chain and prioritize the achievements" (Jovanovic & Devedzic, 2015, p.120). Establishing the credibility of digital badges and ensuring that the various stakeholders value them is also important (Davis & Singh, 2015).

The Introduction of Digital Badges at UCD College of Business

While Dicheva *et al.* (2014) acknowledge that some research studies have been conducted on the implementation of gamification in an educational setting, such studies are limited and have not yet provided sufficient evidence to support gamification in this

context. This paper is intended to address this gap in the research by reporting on the results of a study conducted at UCD College of Business on students' perspectives on the usefulness of digital badges. The paper aims to contribute to what Ostashewski & Reid (2015, p.197) refer to as "an emerging field of study".

Using the achievement tool in the Blackboard VLE, and with active support from colleagues in the UCD College of Business eLearning team, digital badges were introduced at UCD College of Business for the first time in Semester 2 of the academic year 2015/16. Two undergraduate business modules (one full-time and one part-time) were selected as a test-bed for this research. The "Blackboard Achievement" tool has the built-in capability to issue instant feedback to students on the completion of identifiable module goals or tasks as illustrated in Figure 1.

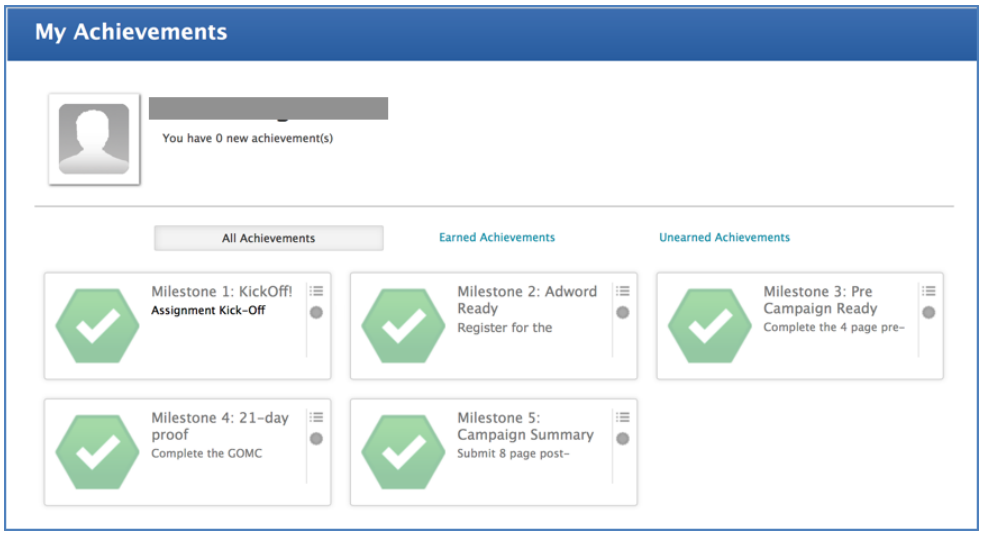

Figure 1: UCD College of Business Achievement Tool Administered by Blackboard

These achievements can be represented visually in the module as individual badges, awarded for progressing through the module workload, acquiring skills or reaching pre-defined milestones. In considering how best to launch and communicate the use of digital badges with the students enrolled to the modules, the authors were concerned that students (and particularly part-time, post-experience mature students) may see these

as a somewhat 'gimmicky' tool perhaps better suited to students at primary or secondary level. With this in mind, both authors used the term 'milestones' which it was felt would help students to embrace the initiative more enthusiastically.

This study set out to address the following two questions:

1. Do the use of milestones in Blackboard help students to set goals for their study and to motivate them to achieve these goals?
2. How useful, overall, are the milestones in improving student learning and student engagement?

Overview of Modules and Associated Milestones

In 2015/16, two undergraduate modules were designed, delivered and assessed.

Module 1: HRM2003D Management Practice 2 is a part-time undergraduate module worth 10 ECTS, and is offered to Year 3 Bachelor of Business Studies students who are mature (average age is in the region of 32 years) and post-experience. In Semester 2, forty-one (41) students were enrolled on this core module. The module is delivered in a distance learning format and required students to attend one two-hour face-to-face class at the start of the semester, along with two 30-minute online classes scheduled throughout the semester. In the previous semester, the same students completed HRM2001D Management Practice 1, the purpose of which was to provide them with an opportunity to formulate a research proposal on a human resource management or managing change topic of their choice and to prepare a literature review on that topic. The Semester 2 module HRM2003D, then required students to follow through with the same topic by conducting a small piece of in-company primary research (involving interviews with key stakeholders) to establish how the 'theory' surrounding a particular

topic compared to 'practice' in the organisation. In essence, the module required students to design a piece of research, execute the research, write up their research findings and compare these with the academic literature reviewed in Semester 1, and to make recommendations to the organisation on how the practice(s) in question could be improved. Table 1 below provides an overview of the assessment requirements for this module.

Table 1: Assessment Requirements for HRM2003D Management Practice 2

Assessment Component	Nature of Assessment	Weighting
1. Progress Report	Formative	0%
2. Draft Project	Formative	0%
3. Final Project + PowerPoint Presentation Slides	Summative	100%

Five milestones were introduced for this module and these represented key tasks or activities to be completed by students. Of the five milestones, three related to the successful submission of each assessment component set out in Table 1. While the first two of these assessment components were not graded, they provided an important opportunity for students to receive formative feedback from the lecturer that could be taken on board prior to the submission of the final project. The final two milestones were intended to encourage students to engage in certain activities throughout the semester that were designed to help them to maximise the ongoing support and guidance available from the lecturer. These two milestones were awarded once students: (1) structured their draft interview questions around their research objectives and submitted these to the lecturer for comment and (2) made at least two contacts with the lecturer throughout the semester to discuss some aspect of the project or to provide an update on progress made.

Module 2: MIS20040 eMarketing and Social Networking is a full-time undergraduate module worth 5 ECTS and is offered to Year 2 Lochlann Quinn School of Business, international exchange and other UCD non-business students. In Semester 2, two hundred and sixteen (216) students were enrolled to this elective module. Students were required to attend a one-hour lecture plus a one-hour workshop/tutorial each week for twelve weeks. The module addressed the concepts and specific skills related to electronic marketing (eMarketing) and social media strategy. One of the module assessments required students to design and implement an online marketing strategy for a small or medium sized organisation as part of an international online marketing challenge (http://www.google.com/onlinechallenge/) organised by Google (GOMC). The GOMC assignment (30% of the overall module grade) was completed over a period of eleven weeks. In previous years, the module co-ordinator posted tentative project milestones to Blackboard that students could follow voluntarily. In order to keep closer control of group progress, the module coordinator piloted a digital badges approach in 2015/16 allowing students to record their achievements spanning over the eleven-week period. Table 2 provides an overview of the assessment requirements of this module.

Table 2: Assessment Requirements for MIS20040 eMarketing & Social Networking

Assessment Component	Nature of Assessment	Weighting
1. Google Online Marketing Challenge	Summative	30%
2. MCQ tests	Summative	10%
3. Social Media Impact Analysis	Summative	20%
4. Written Examination	Summative	40%

MIS20040 carried six milestones (achievements), namely “Project Kick Off”, “Setup Google AdWords”, “Pre-Campaign Upload”, “Campaign Proof”, “Setup Microsoft

Bing" and "Project Completion". The lecturer utilised milestones for formative feedback exclusively designing this task as a non-mandatory one for students to complete (or not). Thus, milestone completions did not carry any module grade weight, and student uptake to complete the milestones was relatively low. Although, ninety-seven students completed the first milestone (Project Kick Off in week 2), submissions dropped to zero for some of the other milestones. As a direct result of this low completion rate, a 10% grade weight has since been assigned to MIS20040 milestone completions.

Figure 2 outlines the lecturer view of the module's achievements showing how many students achieved the respective milestones. Once a student had submitted the relevant milestone information or documents, the digital badge appeared in the "earned achievements" category.

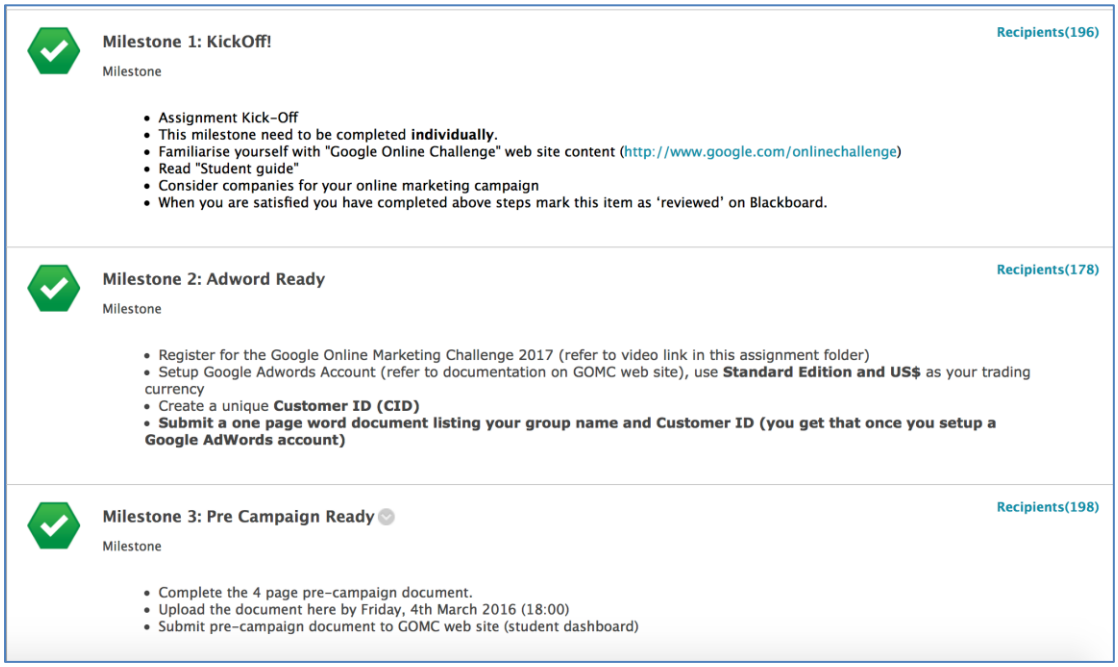

Figure 2: UCD College of Business Achievement Administration (Lecturer view)

Research Design

A small-scale survey was conducted in April 2016 among students registered to the two modules, HRM2003D Management Practice 2 and MIS20040 eMarketing & Social Networking. The survey was made available to students using the Qualtrics survey software platform (http://www.qualtrics.com) and was circulated to students by the Programme Manager in the case of HRM2003D and by the Management Information Systems Subject Area Administrator in the case of MIS20040. Data was gathered around students' usage of the milestones, whether the purpose of and guidelines for using the milestones was clear, and the extent to which the milestones helped students to set goals for their study. Students' perspectives on whether the milestones helped to motivate them to achieve these goals and were an effective way of highlighting progress made on the module were sought. Data was also gathered on how often students checked the status of the achievement of the milestones, whether students paid most attention to the milestones that contributed towards their module grade, how useful the milestones were overall, and if students did not use the milestones, what would motivate them to use them in the future.

Before presenting the results of the study, it should be noted that prior to the administration of the above mentioned survey, ethical approval was sought from the UCD Human Research Ethics Committee, and this was granted in April 2016. Such approval was required as the research involved students. The research was conducted in line with UCD Code of Good Practice in Research and the UCD Research Ethics Policy.

Findings

Survey Respondents

A total of 56 students (22 from HRM2003D and 34 from MIS20040) responded to the survey and Table 3 below provides an overview of these respondents.

Table 3: Survey Respondents

Gender	%	No. of Students
Male	68%	38
Female	32%	18
Total	100%	56
Programme	%	No. of Students
Bachelor of Commerce	39%	22
Bachelor of Commerce International	16%	9
Bachelor of Business and Law	0%	0
Bachelor of Business Studies	41%	23
International Exchange Student	4%	2
Total	100%	56
Module		
HRM2003D Management Practice 2	39%	22
MIS20040 eMarketing & Social Networking	61%	34
Total	100%	56

Milestones Awarded

Table 4 below provides an overview of the number of milestones awarded on each module.

Table 4: Milestones Awarded and Criteria for Award

	Milestone	Criteria	Milestones Awarded (Total 41 students)
Module 1 – HRM2003D	1	Submission of Progress Report	40
	2	Submission of Draft Project	35
	3	Submission of Final Project + PowerPoint Presentation Slides	41
	4	Submission of Draft Interview Questions Structured around Research Objectives	32
	5	Made at least two contacts with the lecturer to discuss project/provide update	22

	Milestone	Criteria	Milestones Awarded (Total 216 students)
Module 2 – MIS20040	1	• Assignment Kick-Off • To be completed individually • Project Familiarisation • Read Study Guide	97
	2	• Setup Google AdWords • Create a unique Customer ID (CID) • Complete Pre-Campaign Doc	0
	3	• Familiarise with Microsoft Bing • Setup Microsoft Bing Account • Import Campaign to Bing • Run Bing Campaign	48
	4	• Google Campaign Summary	0

Milestone Usage and Frequency of Checking Status

Students were asked whether they had used the milestones feature in Blackboard for their module. The responses to this question are presented in Table 5 below. In total, fifty-five students responded to this question (21.4% of the total number of students enrolled to both modules).

Table 5: Did you use the milestones for the module selected above?

Answer	%	Count
Yes	84%	46
No	16%	9
Total	100%	55

Where students did not make use of the milestones, they were asked about what might motivate them to use them in the future. The purpose of this question was to provide both lecturers with some insights that might be useful to be aware of when planning for the next offering of the modules. Of the students who commented on this, two suggested that all milestones should be made mandatory. At the outset of the module, how to use the milestones should be explained to students ("*It was never explained how to use the milestones. They just sat on blackboard…I was unsure how to enable them*"). Some students also suggested that a certain percentage of the grade should be allocated to each milestone, and this would encourage students to pay more attention to the milestone and the associated learning activities. The challenge of ensuring that effective use is made of milestones where group work is involved in the module assessment was highlighted ("*If I was doing individual work it would be easier to keep to the milestones*...").

Table 6 below provides an overview of the frequency with which students checked the status of milestones, both earned and yet to be achieved, on Blackboard. Just over eighty-six percent of the students who responded to the survey checked Blackboard at least weekly or monthly.

Table 6: Achievement of milestones - frequency of checking

Answer	%	Count
Daily	2%	1
Weekly	43%	19
Monthly	43%	19
Never	12%	5
Total	100%	44

Interestingly, the lecturer for HRM2003D received queries from three students during the semester where they had noticed that they had not been awarded a milestone in Blackboard, yet they felt they had completed the requirements for that milestone:

> *"I noticed that within my milestones I didn't get a tick for requesting feedback on my draft interview questions. I would have sent these to you in February and feedback was given by you. Could u update my milestone or did I miss something?"*

> *"I have noticed that the milestone for the draft interview questions is missing from the check list. Could you have a look and get back to me as to why it hasn't been ticked please?"*

> *"I did notice that I have not yet got a green light for the interview questions milestone - I presume this will update in time".*

On checking the status of the milestone for the three students in question, while they had submitted their draft interview questions to the lecturer for comment and feedback, these had not been structured around the student's research objectives and this was a requirement for the award of the milestone. Going forward, this requirement will be stated more clearly in the guidelines for the module. The above queries do, however, suggest that students did pay at least some kind of attention to the status of the achievement of the milestones in Blackboard.

Purpose of Milestones and Clarity of Guidelines

The next two questions examined the extent to which the purpose of and guidelines for achieving each milestone were made clear to students. The results are presented in Tables 7 and 8 below and these suggest that students received clear information on the milestones from the outset of the modules.

Table 7: The purpose of the milestones was clear

Answer	%	Count
Strongly Agree	52%	23
Agree	34%	15
Neutral	12%	5
Disagree	2%	1
Strongly Disagree	0%	0
Total	100%	44

Table 8: The guidelines for achieving each milestone were clear

Answer	%	Count
Strongly agree	43%	19
Agree	46%	20
Neutral	7%	3
Disagree	2%	1
Strongly Disagree	2%	1
Total	100%	44

Milestones as a Means of Organising Study and as a Motivator

Table 9 provides an overview of students' perspectives on the first research question - i.e. did the use of milestones in Blackboard help students to set goals for their study and to motivate them to achieve these goals? The below narrative comments provided by a small number of both part-time and full-time students suggest that the milestones were of some help to them in organising their study.

> *"...Gave a clear indicator on what to focus on, provided deadlines - particularly useful for group work."* (full-time student)
>
> *"It is very good in order to organise the amount of work throughout the semester. If all team members see this, they might start doing group projects earlier and it will result in a better grade and understanding of the requirements."* (full-time student)
>
> *"They gave me perspective on a good pace to complete the work of the module. This helped me to manage my time..."* (full-time student)
>
> *"I found that they helped guide my progress and were very useful when setting out my assignment roadmap."* (part-time student)
>
> *"The milestones forced me to be more organised which I liked. I did not have to rush any work at the end as I was well prepared."* (part-time student)

The results presented in Table 9 give a very positive picture in terms of the ability of milestones to motivate students, with the clear majority of respondents finding the milestones useful from this perspective.

Table 9: The milestones helped me to set goals for my study and helped to motivate me to achieve these goals

Answer	%	Count
Strongly agree	27%	12
Agree	50%	22
Neutral	7%	3
Disagree	16%	7

Strongly Disagree	0%	0
Total	100%	44

Four part-time students provided a narrative comment on the issue of motivation, with two of these positive and two negative in terms of the contribution of the milestones to student motivation levels. One of these students suggested that *"three out of five of the milestones were necessary to get graded on so most people would surely complete these. The other two might motivate a less motivated student"*. The other student commented as follows: *"I found it useful and as some additional motivation in a module where we see no grade until the end of the semester"*. The other two comments were negative in terms of the contribution of the milestones to student motivation levels. One student commented: *"I knew they were there but had no influence on motivation or anything I did. I would have done the work the same way if they weren't there"*. The other student suggested that the milestones were *"not very useful, felt more like a distraction from what I was actually supposed to do and instead of organising study my own way had to adjust it to fit the milestones"*. A fifth part-time student made the below comment:

> *"To be honest I never really paid too much attention to the milestones and concentrated on the actual deadlines. In my honest opinion they felt a bit like being a "MacDonalds" worker".*

Overall Usefulness of Milestones

Table 10 provides an overview of students' perspectives on the second research question - i.e. how useful, overall, were the milestones to students? The clear majority of respondents indicated that the milestones are an effective way of highlighting progress made on completing the requirements of their module.

Table 10: Milestones were an effective way of highlighting progress I have made on the module

Answer	%	Count
Strongly agree	27%	12
Agree	48%	21
Neutral	16%	7
Disagree	9%	4
Strongly Disagree	0%	0
Total	100%	44

Below are narrative comments from eight (8) students that highlight the benefits of adopting a set of milestones for the purpose of maintaining and tracking progress. Of particular note is that the use of milestones for the purposes of maintaining, and keeping track of, progress made was equally beneficial by both part-time and full-time students.

> *"Milestones are a nice way to track progress and structure the work load of an assignment."* (part-time student)
>
> *"I found the milestones a useful companion to my study calendar."* (part-time student)
>
> *"They were a constant inline check for me. They gave structure to my targets."* (part-time student)
>
> *"helpful to reassure you are doing the right thing. Milestones were useful for making me keep on track of my project and ensured timelines were met."* (part-time student)
>
> *"They gave me perspective on a good pace to complete the work of the module. This helped me to manage my time and to keep my progress in the back of my mind, despite not meeting every single milestone on time."* (full-time student)
>
> *"Good way of keeping track of what had to be done" (full-time student).*
> *"I think they're a great idea and a fantastic way of tracking your progress!"* (full-time student)
>
> *"Very useful, good indicator of what progress you should be making at a particular stage and helps you not to fall behind."* (full-time student)

Discussion

This research study set out to explore whether digital badges awarded to students through Blackboard helped them to set goals for their study, to motivate them to achieve these goals, and to assess their usefulness in improving student learning and student engagement. Having extensively investigated the relevant literature, the survey data and comments received from students as part of the UCD student feedback on modules (SFM) process, the authors are confident that the utilisation of digital badges resulted in a positive student and learning experience. In particular, students who completed all milestones successfully considered them a highly effective pedagogical tool for increasing student engagement and improving the overall learning experience.

As discussed earlier, digital badges are a form of gamification. Both UCD lecturers harnessed the benefits of digital badges highlighted by Kapp (2012) and Finkelstein *et al.* (2013), i.e. they were designed to recognise tasks achieved and to provide quick feedback to students on progress made regarding the required module learning and assessment activities. The digital badges awarded to the UCD students were designed to recognise their participation in a learning activity, their achievements following this participation and ultimately their learning, and this supports the noted outcomes of badges highlighted in the literature (Casilli & Hickey, 2016; Gibson *et al*., 2015; Law, 2015). The badges also allowed for the module assessment requirements to be presented to students in a visual way (Ahn *et al*., 2014; Finkelstein *et al*., 2013). Furthermore, the results support Hamari & Eranti's (2011) argument that digital badges can function as a guidance mechanism providing students with information on what is expected of them, and with feedback on their learning progress.

Student feedback on the usefulness of the digital badges is also in line with Becker and Nicholson's (2016) assertion that students must become active learners to take ownership of their own learning. Considering the rather large student cohort for MIS20040 (eMarketing and Social Networking), for example, digital badges helped the students to become more engaged with the module content and delivery while gaining ownership of their own learning. Consequently, moving learning-related ownership and responsibility to students resulted in more positive student feedback related to both modules. In order to create an even more engaging and supportive learning environment for today's student who - in many cases - has not experienced life without mobile technologies, the lecturers enabled a mobile version for digital badges. The mobile version was primarily implemented to make it easier and more convenient for the mobile and 'tech-savvy' learner to improve and maximise module content engagement.

As outlined in the findings, many students regarded the task of completing milestones and achieving digital badges as very effective and positively contributing to their level of motivation, a benefit of digital badges noted by Simões *et al.* (2012). The badges allowed them to stay *"on top of things"* related to the module assessment structure and associated workload; they helped with weekly study workload; and encouraged engagement with the module content and associated learning activities outside of the module's scheduled face-to-face classroom hours. However, it needs to be stated that the milestones not carrying any module grades somehow discouraged students completing them and - as a direct result - gaining the digital badge/achievement for it. In the case of MIS20040, the module co-ordinator decided to continue utilising the digital badges initiative for the 2016/2017 academic year with "Digital Milestones/Badges" now being introduced as a gradable assessment component

carrying 10% of the overall assignment grades for this module. This decision should help to considerably increase the milestone completion rate.

Conclusion and Further Research

Utilising digital badges associated with achieving milestones can be identified as a valuable tool to further engage students and to achieve an overall improved learning experience. However, this research also suggests that students are only willing to complete digital milestones if they are getting rewarded in the form of module grades.

There are several limitations to this research: it was relatively small-scale in nature; it focused on two modules at undergraduate level only; and was conducted in a single HEI. To overcome these limitations, the authors suggest a need for further research to be conducted across a greater number of modules and institutions. Perhaps, the open-access professional development programmes recently developed by the National Forum for the Enhancement of Teaching and Learning in Higher Education and referred to earlier could be interesting to include in any future research on the topic. The authors recommend that any future research addresses the following questions:

1) How can additional content delivery strategies based on gamification such as online simulations, be incorporated to improve student learning?
2) What are best practice assessment strategies for game-based learning?
3) What are the factors motivating different student cohorts (undergraduate, graduate, full-time, part-time) to work towards earning digital badges for better learning?

4) As the majority of today's and tomorrow's students use mobile devices such as smartphones or tablets, would merging the aforementioned with gamification initiatives further improve the student's overall learning experience?

Acknowledgments

The authors would like to sincerely thank the Business eLearning team at UCD College of Business, particularly Niall Flaherty and Elanor McDonald, for their valuable guidance and ongoing support in implementing digital badges on both modules.

The authors would also like to thank both reviewers for their comments on an earlier draft of this paper.

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