

Blended learning as a disruption in a vocational education building program

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A building and construction teaching team in a vocational education school (within a university in Melbourne) introduced a blended learning model to one-third of their program. Traditionally, building students are accustomed to a high ratio of face-to-face learning, therefore, this new model disrupted the experience of both teacher and student. The model was examined using e-learning evaluation research methodology and findings are presented using the framework of Glazer's (2012) characteristics of blended learning. Examination of the program identified areas in need of attention, such as active learning and online interaction and communication. Finally the authors promote the use of Glazer's framework as a pedagogical evaluation tool for blended learning designs, while drawing out a particular focus on teacher presence as a distinct item in this framework.

Introduction

A building and construction teaching team in a dual sector university in Melbourne introduced a new technology-enhanced pedagogical model that disrupted the way the vocational teachers and students typically teach and learn. While building and construction students traditionally experience a high ratio of face-to-face learning, this discipline is a leader in the adoption of e-learning by trade teachers compared to other Australian vocational education (VE) disciplines (Callan, Johnston & Poulsen, 2015). The VE building teaching team was initially inspired to introduce an inverted or 'flipped classroom' model after attending a SoTL (Scholarship of Teaching and Learning) presentation in a higher education (HE) context. However, traditional HE styled lectures were introduced as part of the VE model, a decision that was somewhat antithetical to a flipped model. The team subsequently recognised that their intervention corresponded more broadly to the idea of blended learning practice.

Students in the Diploma of Building and Construction ('Building') learn business aspects of the industry, learning how to plan, coordinate and control construction projects from inception to delivery. The two-year Diploma has two entry points per year; a student may commence first year in February or July. The Building teachers refer to Semester 1 to 4 (S1-S4) to describe the stages of the diploma.

In 2015 the implementation of the model in a single Building course (subject) was endorsed by a university team teaching award. Simultaneously, the teaching team

successfully pitched a project to target 600 of the diploma's 1,800 nominal teaching hours for similar intervention. Four subject areas, one from each semester of the program including three single courses and one cluster of three courses, were redesigned to a blended learning model using a rapid, just-in-time development model. The intention was for a consistent subject design involving the courses:

- ASP (S1 of 4): 'Apply structural principles to residential low-rise constructions'
- LCT (S2): 'Administer the legal obligations of a building or construction contractor'; 'Select, prepare a construction contract'; 'Prepare, evaluate tender documentation'
- ENV (S3): 'Environmental management practices and processes in building and construction'
- IDS (S4): 'Identify services layout and connection methods to medium rise construction projects'.

The owning school then contemplated wider adoption of the model and requested university support to evaluate the intervention, to allow evidence-based modifications, and to inform decision-making regarding up-scaling. The ensuing research project, as presented in this paper, was designed using e-learning evaluation research (Phillips, McNaught & Kennedy, 2012). The data collection involved a me-us-IT/it approach in which the 'me' view was harnessed from students, teachers and technology support staff who were individually interviewed (and students surveyed); the 'us' view from students interviewed in groups, and from a culminating workshop with the teaching team. In most individual interviews, participants demonstrated their activities via laptop to



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illustrate their interactions and role as related to the new model, thus providing their views of pedagogy and technology.

Literature review

Prior to focusing on blended learning this literature review begins by mentioning the inverted or 'flipped classroom' model, the genesis of the Building teachers' change in pedagogy. The flipped classroom intervention is one model of blended learning in tertiary education that utilises face-to-face and online learning modes in a symbiotic fashion. 'Front loading' where exposure to online content occurs first, is built upon in face-to-face class experiences (Glazer, 2012). The flipped classroom pivots on the notion that activities which students have traditionally experienced in the classroom or lecture theatre take place prior to on-campus attendance—relying heavily on videos, presentations or other media for learning via acquisition (*sensu* Laurillard, 2012)—while more interactive or 'homework' like activities are experienced in the physical classroom environment (Al-Zahrani, 2015; Lage, Platt & Treglia, 2000). This enables moving relatively passive learning of lower cognitive levels out of a lecture format to the online environment, while active learning experiences demanding a higher cognitive level become the focus of the physical, face-to-face environment (Toto & Nguyen, 2009).

Blended learning enables a wider range of pedagogical designs in tertiary education beyond the flipped classroom. In Bonk and Graham's much-cited *Handbook of Blended Learning*, Cross (2006) criticises oversimplifications of blended learning. This pedagogical approach is often defined in ways that avoid explicit use of the term 'blend' or its synonyms, referring simply to multi-modal (online and face-to-face) learning (e.g. de Leng et al, 2010; Garrison & Kanuka, 2004; Graham, 2006). It becomes important to look beyond simplistic definitions that may overlook the need for a synergy between the learning environments. For example, Garrison and Kanuka add the need for a "thoughtful integration of classroom face-to-face learning experiences with online learning experiences" using the strengths of both (2004, p.96). Graham's initially oversimplified working definition: "Blended learning systems combine face-to-face instruction with computer-mediated instruction" is given more weight by the qualifier: "the ongoing convergence of two archetypal learning environments" (2006, p.66). More recent technological enhancements in interaction, communication, and socialising, for example, enable a higher fidelity of learning in online environments.

In vocational education contexts blended learning has been described as:

the systematic integration of learning in face-to-face and online situations within the same

course in order to support the development of understanding (Bliuc et al, 2012, p.238)

e-learning... as part of a blended learning experience where it is embedded into teaching, training and learning... [and] is at its best when it... encourages collaborative learning and interaction between many groups of people (e.g. teachers employers and apprentices) who accept the benefits of the integration of e-learning within other forms of delivery (Callan, Johnston & Poulsen, 2015, p.296).

Blended learning is more effective in a symbiotic relationship, developed through the mutual alignment and combination of complementary and connecting attributes from each learning environment (Garrison & Vaughan, 2008; Glazer 2012; Littlejohn & Pegler 2007). Glazer (2012) identifies several characteristics of blended learning, drawn from a range of practice examples, (paraphrased and/or further interpreted by the authors) here listed in our order of G1-G7:

- G1. Various pedagogies: specific pedagogical designs accommodated; not a one-approach-fits-all.
- G2. Active learning: going beyond supporting active learning to demanding it; provide strategies to process information, check their understanding, revise knowledge, and practice skills.
- G3. Time expansion: students may choose to spend longer learning online than they typically would in timetabled classes.
- G4. All students have a voice: online discussion allows each to contribute regardless of speed or personality; it is obvious who contributes; additional benefits of reflection and proofreading posts.
- G5. Face-to-face time is valuable: class time is freed from information transmission to include deeper learning opportunities, such as complex discussions, debates, team presentations, community building, hands-on activities, high-level evaluations, trouble-shooting and problem-solving.
- G6. Learning responsibility and knowledge organisation: develop lifelong learning attributes; organise new knowledge to employ as they move between modes; rise to the challenge of more control and responsibility; exercise discretion where they have choice to personalise their learning.
- G7. Subject layering: an interdependence between the learning environments to experience layers of content by attending to both online and face-to-face learning, with visible teacher presence/feedback in each.

Glazer's characteristics are supported by other theoretical and/or practice examples. Güzer and Caner (2014)

reviewed blended learning studies from 1999 - 2012, finding that support, flexibility, enjoyment and motivational factors were insufficient to promote successful learning. They concluded that students needed to be more active (G2) via social interaction and collaboration (G4). They also found that despite use of blended learning from school through to postgraduate levels that pedagogical design needed more attention (G1, G7) to maximize the benefits of this approach.

Douglas et al (2014) studied blended learning with the aid of an online video annotation tool across nine student cohorts, comprising six discipline areas from three educational levels (vocational, undergraduate and postgraduate). They found that curriculum design involving online learning and how it aligned with other subject components was a significant success factor (G1, G7). Further, they found that sound pedagogical design should be coupled with clear communication of the purpose of the pedagogy, providing a narrative to aid students' understanding of the potential value they can glean from their learning (G6).

In engineering education, Toto and Nguyen (2009) received student survey feedback on their blended learning model indicating that the (flipped classroom) pedagogy was appropriate for the topics (G1) and suitable layering occurred (G7), in that students who watched a 30-minute video lecture online felt that they were more prepared to tackle problems provided in class. Additional scaffolding involved a 'door check quiz' where students answered a few short questions based on the video. This had the benefit of helping students create a mental knowledge organiser regarding key concepts (G6). The students largely valued the class time for group work and problem-solving, albeit some individuals disliked the new class structure, such as waiting time or lack of rigid order (G5). While active learning was promoted in the classroom, it appears that learning online was less active (G2). Students noted the tendency to 'sit back and absorb' or to be 'distracted' while watching a 30-minute video lecture.

Callan et al (2015) highlight that in blended learning design for vocational education more attention should be paid to interaction and collaboration (G2, G5) and subject layering (G7). Bluc and colleagues reinforce the need for subject layering, arguing that it is "essential that different elements of the learning experience are integrated in order to provide students with a holistic learning experience" (2012, p.238).

Methodology

To achieve scholarly evaluation of the Building blended learning model, this study employed an e-learning evaluation research methodology, within a qualitative inquiry research paradigm. E-learning evaluation research

recognises that online learning environments or e-learning artefacts are the result of design activities, including resources, communication technologies and learning tasks (Phillips, McNaught & Kennedy, 2012). This approach requires the input of key stakeholders (*ibid.*) therefore participation was sought from students, teachers and technological support personnel.

The research questions were originally framed in response to the flipped classroom brief provided to the researchers. After the initial stages of investigation the first question was subsequently updated to reflect the blended learning model:

1. How is the blended learning model designed? What constitutes the model and how do the components align?
 - (a) How do students learn from, and
 - (b) How do teachers teach using: the online components compared to the on-campus/face-to-face components of the program?
 - (c) Do students value their learning from the model? Why/why not?
2. Can the design of the model be improved to enhance the learning experience? If yes, how?

Within an e-learning evaluation methodology (Phillips et al, 2012), a range of data collection methods were employed (see Table 1). A culminating teaching team workshop was inspired by activity theory and expansive learning, allowing contradictions related to the teaching objective to surface, with the potential to initiate new forms of practice (Engeström, 2001). Students enrolled across the Diploma numbered almost 500, yet the low student participation numbers are a limitation of this research. Conversely, almost all the Building teachers participated in either an individual interview, the teaching team workshop, or both. There was a gender mix across both groups, albeit the majority were male.

The research questions adequately served the purpose of data extrapolation for report creation and subsequent submission to the owning school within the university. For deeper analysis, this paper used the data elicited from these questions, organised and analysed within NVivo qualitative data software, to allow themes to emerge that the authors aligned to Glazer's (2012) blended learning characteristics.

University ethics clearance was gained prior to data collection. Codes are used in this paper to protect confidentiality while differentiating participants. Student codes are S1-S4 for individual interviews, SG1-SG2 for groups, SQ for student questionnaire; teachers T1-T5 for individual interviews, TW for teacher workshop; and TS1 for technology support staff interviewed.

Table 1: Data collection range (note: it = pedagogy; IT = educational technology)

Participant group	Data collection methods and participant numbers	View from/of Me. Us. it/IT
Students (n = 24)	Online questionnaire (n=14) (primarily qualitative)	Me. it
	Interactive interviews (n=10) <ul style="list-style-type: none"> • Individual (incl. demonstration) (n=4) • Group (2: n=2; n=4) 	Me. it/IT Us. it
Teachers (n=7)	Interactive interviews <ul style="list-style-type: none"> • Individual (incl. demonstration) (n=5*) 	Me. it/IT
	<ul style="list-style-type: none"> • Teaching team workshop (n=6*) (*4 teachers participated in both) 	Us. it
Technical support (n=1)	Interactive interview (n=1) <ul style="list-style-type: none"> • Individual (1 teacher also had a partial technical support role) 	Me. IT

Findings

It was clear from the teacher interviews and workshop (and reinforced in some student interviews) that the teachers shared at least one objective: facilitate student learning and progression toward their future careers. It was universally recognised that the model needed improvement.

This section presents selected data from the study that relate to Glazer's (2012) characteristics of blended learning, described in the literature review of this paper. This includes pedagogical approach (G1), active learning (G2), time expansion (G3), student voice (G4), valuable face-to-face time (G5), learning responsibility and knowledge organisation (G6), and subject layering (G7).

Pedagogical model (G1)

Descriptions of the Building blended learning model across the data mainly relied on structural elements, which were in turn represented inconsistently by participants. A composite representation, based on the most similar descriptions across the data, is that the students participate in (1) lecture; (2) online learning comprising: a) recorded lecture, b) worksheet and c) online session including d) quiz; and then (3) tutorial/workshop. Overall, there was little on the pedagogical reasoning provided for the blended learning model. First intended as a flipped classroom, the model was compromised when lectures were introduced to students who hadn't previously experienced this format, by vocational teachers who hadn't previously lectured. At some point teachers became aware of this anomaly and changed their terminology to blended learning, without further adjustment to the pedagogical design, and with occasional terminology slippage. One teacher explained, "Flip is a component of the blended model, as blended has a lot of things in it: lecture, online, workshop or tutorial as it's called. Therefore, flip doesn't completely describe what we do" (T1).

A student pair interviewed (SG1) identified structural variation between courses. They expected the weekly format to be a lecture, followed by online activities including a quiz, followed by a tutorial. They agreed "That's what they said is meant to happen. It has not happened like that at all, not once." The two students experienced the iterations of all four blended learning subjects (including when first titled as 'flipped'). These students highlighted that the timetabling of large cohort lecture theatres negatively constrained one subject (ASP) to a lecture-online-lecture model, while another (LCT) always timetabled in a computer lab or classroom meant they experienced tutorial-online-tutorial. This was coupled with constraints for one cohort's timetabled attendance on Monday and Tuesday, resulting in Monday night being the only time available to complete the online learning.

A student interviewed from a newer cohort referred generically to 'classes', where "we have two classes in a week.... the first one it's, it's a bit theoretical, you basically learn the framing members and stuff. And the second one... goes to the math part of it... the second class is I think more important to me. The first one is just the introduction I would say. In the middle we have this online lecture where you learn more about more detailed things" (S2; several filler words removed).

Active learning (G2)

Student descriptions of their actions in the Building blended learning model indicate that the tutorials/workshops are the most interactive element, compared to less interactive learning demands in the lecture and the online elements.

Half the student questionnaire respondents said that they only passively view the online resources before attending class, and others were strategic in minimising viewing if at all (see Table 2). A minority of activities were conveyed, relating to note-taking, completing the quiz, and assessment-related work.

Table 2: Student questionnaire responses to actions with online resources

Theme	No.	Example response (verbatim)
Watch video/online session before class	7	<ul style="list-style-type: none"> • Watch the necessary recordings before class • Viewed the online content including the videos and presentations.
Watch video/online session before class PLUS an action	2	<ul style="list-style-type: none"> • Watched a video, sometimes took notes. • watch the video on the train, or after our lecture... to complete the portfolio associated with that video... go over past videos to make sure you haven't left out any information in your assignment
Minimise effort related to watching pre-class video/online session	2	<ul style="list-style-type: none"> • Skip through the video and do the quiz 5 minutes before workshop class. didn't take note of information just sourced the information required for quiz • Used the videos as a reference
Sometimes / Did not complete pre-class video/online session	3	<ul style="list-style-type: none"> • I do not have a computer or laptop at home. I don't access the lecture material until they are presented in the classes • I used them when I needed to
Total responses:	14	

During individual student interviews, strategies nominated by students to process information and check understanding included:

- *doing the online lesson... It's like the homework for us to have done before to go to class so that we have the brief understanding about the content or topic that we're going to talk about. (S1)*
- *the online content is more or less a lecture for you, so you're able to take notes... replay stuff if you didn't understand it... I do it [online work] before the lecture... and then if I have any questions I'll ask... the teacher, either in the lecture or the tutorial, depending on where I can (S3)*
- *you go to the lecture, and then the online session goes up... [you go] over the stuff that happened in the lecture, so you understand it even more. And then you need to do the online session before the class, because there's a quiz, which... tests your understanding of what you've learned. (SG2)*

Some teachers expressed disappointment that the online sessions are not more interactive, as did the technology support person who discussed production limitations including tight timelines and limited software. He conceded "the quality has dropped off a little bit this year... we seem to be getting less and less time... trying to turn stuff around in a week" (TS1). One teacher expressed: "I was advised about this, it would be very interactive... These slides are just text supported by a few images [and audio narration]" (T4). The teacher opened an online session to demonstrate how a complex scenario-based question necessitating detailed discussion is presented on one slide, moving immediately on to

another slide with another complex question. This teacher compensated by showing the online sessions in class and initiating classroom discussion.

Time expansion (G3)

Flexibility in regards to 'when', and ability to spend more time with the online resources, was appreciated by almost all student participants. For example, the questionnaire asked if the online resources were easy to use; 13 respondents agreed (one didn't), with four of 12 comments noting:

- *They [online resources] can be accessed and re-watched any time*
- *They are good if you can't attend the class*
- *Can watch over and over again if I don't understand it.*
- *You can watch them at your leisure and are able to re visit the lesson when needed.*

Apart from the Monday-Tuesday cohort who were constrained to complete the online activities on Monday night, appreciation for the flexibility of the online learning was supported across student interviews with comments such as:

- *[the online learning is] basically the repetition of what's happening in the first class. It's basically helped me understand if I missed something in the class that I can repeat it, like I can watch a video, like heaps of times. Which is helpful. (S2)*
- *the first time [viewing] is just mainly getting an idea of how it's set up... and then knowing where that is for when I see a question, I can jump back to it. (S4)*
- *It provides a lot of information about the subject which you can go over it over and over if you don't understand it, which in a lecture or class you might miss it or you might not understand it as much. Where at home, it's online, you can go over and over. (SG2)*
- *I just feel it gives you more time to actually do more things or, if you need to spend more time on it, you're able to. But it's up to you... you set your own pace (SG2).*

A dissenting comment in the student questionnaire noted:

- *The nature of the lectures is that we are over-worked to learn the flip-Resources before lectures. I attend the Lectures and then go to the Flip Material to understand the lectures better. (SQ)*

All students have a voice (G4)

The findings suggest that the student voice is more isolated in the online compared to the face-to-face learning elements. For example, when students were asked in the questionnaire how they communicate with their student peers and teachers during the online

learning activities and before they attend classes, a majority said there was no or limited communication with peers or teachers during their online learning (see table 3).

Table 3: Student questionnaire responses regarding communication during online activities

Theme	No.	Example response (verbatim)
No or limited communication with peers or teachers during online learning component	10	<ul style="list-style-type: none"> • I communicate with my fellow students only in the classes • Usually during workshop/tutorial classes. • Not much communication • Don't / I don't / You don't (x5)
Email communication or other means	3	<ul style="list-style-type: none"> • i talk with my classmates in the flip course frequently. • Mainly email • Just communicate using ... [university] emails.
Total responses:	13	

Face-to-face time is valuable (G5)

The Building students place different value on the face-to-face elements of the blended learning model, most placing more value on the tutorial/workshop compared to the lecture. When asked in the questionnaire what they do generally in the on-campus or face-to-face classroom, several responses reflected teacher-directed activities (see Table 4).

Table 4: Student questionnaire responses to actions in the classroom

Theme	No.	Example response (verbatim)
Listen and take notes	3	<ul style="list-style-type: none"> •... listen to teacher use real world examples to reinforce information. Take notes on critical information • I just listened and take down notes. and if ever i forgot something with the topics i'll just jump on the Blackboard [online classroom]
Listen and discuss, +/- work on other activities (e.g. assessment tasks)	4	<ul style="list-style-type: none"> • I listen to lectures. Asking questions and working on Class Activities • Discuss what was mentioned in the videos, what questions are on the portfolio and their answers. We then continue to work on our assignments and have the freedom to ask our teacher any questions
Follow directions from teacher	2	<ul style="list-style-type: none"> • Most of the learning occurs here with direction from the teacher. • Using the teacher as a reference point to do work and asking question to ensure that what I am doing is correct
Miscellaneous	4	<ul style="list-style-type: none"> • How to work in a team setting
Total responses:	13	

Example quotes from interviews with teachers and students illustrate appreciation of the tutorials:

- *the first couple of workshops we'll use all that time establishing foundation, but then... to go through the analytics [problematic areas identified in online quizzes], any additional things we want to touch on*

in the first hour, and then the second hour we will reserve it to do assessment... [where] they can talk about anything they want. (T2).

- *I'd keep the tutorials the way they are going because I think they're really good. It gives them the opportunity, because it's informal, they can have that feedback across [their learning.] (T3)*
- *So we'll talk for an hour, and the last hour-and-a-half everyone will be working on their assignment. Or people who haven't done online quiz will do online quizzes, it's just whatever you want to do, you do. And then we've got that whole time to ask questions. (S4)*
- *A lot of the time it's working on assignments [in tutorials] or again, if we have any questions from the lecture or the online lesson [the teacher]'s more than happy to go over stuff. (S3)*

This compares to more critical feedback for the lectures, for example, advice from students:

- *[improve] the lectures... I think they should make that more interactive... I look around in class, most people are sleeping... They should be different, they should get people from the industry and ... incorporate... Kahoot's tests [student quiz/polling tool] into the lecture (SG1)*
- *Lecture unnecessary. (SQ)*
- *[time wasted when] in class lecture[r] plays the online lesson that you have already watched. (SQ)*
- *Add 1 hour to workshop class and cancel lecture. (SQ)*

Most of the teachers interviewed were critical of the lectures. However, even a supportive teacher referred to the lectures as of "no other value than to introduce the topic and create interest... it's not a classroom session, it is a lecture session" (T2). Other teachers referred to the lectures as, e.g.:

- *[students] switch off... the weekly lectures sometimes you're sort of grasping at information to give to them because it doesn't really fit to the lecture model. (T3)*
- *The lectures are not working, there are too many students in the room, there is too much noise, and only a few students sitting in the front rows are interacting. Or engaging. With the teaching material. It's not working. We need more time with the students in smaller groups. (T5)*
- *I've been told that the purpose of the lecture is to talk to them about what they'll be learning this week... I'm not going to stand in front of a group of... 50 students or whatever, and tell them what they're going to do... [So I show these online] audio supported Power Points in the lecture. [First adopted as a work-around for the Monday-Tuesday cohort who had limited online time]. (T4)*

In the culminating team workshop, the teachers were presented with aggregate views of participants. The lecture data inspired overt disagreement. Some teachers reacted with “lectures might not be best suited for every single subject”; “reduce lectures”; and have “guest speakers... [to make] lectures more meaningful to the students” (TW). A single voice counteracted with various comments on preserving the model, such as “[they] aren’t being delivered as lectures. If they were... they would be doing what they’re designed to do”; “The flip [sic.] program requires the lecture because it’s part of what’s being delivered”; and “the current lecture scenario is worked on the higher education system... students leave the VE sector, and they articulate into the higher education system, they need to be ready for higher education... 49% of them go over” (TW). A final ‘agree to disagree’ comment came from a ‘no-lecture’ stance, “we’re definitely split... been split on this for a while, haven’t we?” (TW).

Learning responsibility and knowledge organization (G6)

Some students responded positively to the increased responsibility for learning required in blended learning subjects, while others not so. Some of the more positive student views include, for example:

- *you get sent all the information as a lecture and you go over it, and when, say, you don’t understand something there’s your chance to... work out what you don’t understand and you have the chance to come in and ask it in that tutorial later in the week. (S3)*
- *The best thing about it [is] that the teacher allows us to do our own research... so then when we graduate... we’re independent in our own work. (S1)*

Not all students held such positive views, for example:

- *other students take advantage of video learning and dont [sic.] even take the time to watch it at home because of distractions which can cause a lot of downfall in a student's learning. (SQ)*
- *I know the aim of the vocational program is to... do it in class and learn it in classes... But... instead of showing us how to do that, they are basically, expecting us to figure it out... I am basically having a problem with that. (S2)*
- *in class you’re shown... [But] unless you’ve spent a long time going through someone’s previous assignment, then you don’t know... where to begin. (S4)*
- *he’d [teacher] be stuck on something simple, the kids [straight] from high school weren't studying... [or] reading the plans and it held us back from progressing... So he stuck on one subject because fifty people in the class didn’t understand it, majority of the other people understood it but he can’t keep going until they catch up... when he should have just*

moved on and if you don’t understand it do more study or seek help afterwards. (SG2)

One of the teachers interviewed explained his aim to increase student responsibility for deep learning:

- *we’re trying to teach people to think. That’s what Building’s about, is problem solving, yeah? So if you use this blended process correctly, what you’re doing is teaching people not just to accept the material, but to think on the material. (T2)*

Subject layering and constructive alignment (G7)

The student questionnaire (SQ) indicates some support for adequate layering of content in the Building blended learning model. When asked how the online resources help toward classroom learning, a majority of students nominated that they either do help (6/14) or sometimes help (5/14), while a minority said they make no difference (3/14). When asked if they liked the learning experience of the combination of online activities and scheduled classes, 12 students responded that they liked the experience, while two did not. Three of the positive responses related to constructive alignment:

- *When I have used the online lessons they have helped me understand components in the course.*
- *The flip resources explain the lectures much more clearly. When I don’t understand a particular matter, I keep coming back to the segment.*
- *When I have used the online lessons they have helped me understand components in the course.*

Within other questions (SQ), two students stated:

- *We went over the topic/contents and analyses [sic.] the content, find out the right answers. This is only useful when I watched the online session beforehand. If I don’t I am stuck!*
- *a lot of the information needed for the manual we were producing could be sourced from the online videos. This is very helpful as you have the convenience to go over and watch past videos.*

In contrast, some responses to other questions (SQ) suggest an incomplete constructive alignment. For example, when asked if they would recommend the model or suggest any improvements:

- *You learn much less. Good for people who work and can't attend class. [N]ot downloadable for future reference. In person you learn more rather than watching a video. Lecture is timetabled wrong and we just watch the video anyway*
- *Have portfolio activities from the online video that you actually need to complete and it is to be graded so that students don’t just skip the video, do a quiz.*

- *The lessons sometimes say different things to the online lessons which causes confusion.*

Some teachers, while demonstrating the online resources during interviews, acknowledged broad constructive alignment between elements of the blended learning model. For example:

- *the online session and the tutorial... definitely work well hand-in-hand especially when you can say alright so you've learnt this information from your online session now let's apply it in the tutorial... The lectures can serve as a bit of an introduction... I think the whole formula works really great... it comes down to whoever's designing the course to make sure that happens. (T6)*
- *online lesson supports what they should be doing in the tutorial, which is really the work... if they keep up to speed then they won't be behind. (T4)*
- *The worksheet becomes... the driver for the blended session... So lecture, take home the worksheet, do the online, then we break it all down in the workshop... Every week... [the worksheet] task will always have something to do with compiling their assessment... So you do the work, you get the benefit... they either do it or they've got problems. (T2)*

In the culminating workshop (TW), a teacher noted that the blended learning subjects form a part of the overall Building course, and that further evaluations could look across the whole program rather than just focusing on the blended learning subjects.

Discussion

The Building blended learning initiative was organically developed by the teaching team, none of whom were particularly well-versed in blended learning theory. Their reflections on practice revealed successes and challenges which we have analysed via the work of Glazer (2012).

Glazer's (2012) seven characteristics of blended learning provide a robust framework with which to evaluate the intervention in the Building program. Overall, the Building model most readily aligns to Glazer's characteristics of time expansion (G3) and learning responsibility and knowledge organisation (G6). However, not all vocational students were ready to take on the responsibility of self-directed learning that the model required. The more self-directed students were only negatively affected if the teacher used some of their face-to-face time to bring the lagging students up to speed.

The active learning characteristic (G2) was best met in the tutorial/workshop elements of the model where students tended to most value their face-to-face time (G5), while the lecture was viewed as relatively passive and least valued by the students. There was disagreement among

the teachers as to the value of the lectures. Introducing lectures into a VE setting misaligns to a contemporary shift in HE blended learning away from transmission-styled lectures (e.g. Garrison & Vaughan, 2008).

Student descriptions of their actions in the online learning element tended to illustrate relatively passive learning demands (G2). While Glazer reminds us that asynchronous online learning need not be passive, Laurillard (2012) acknowledges that learning through acquisition still has a place in formal learning, albeit the challenge is to promote active engagement with content, e.g. via interaction and learner control. This aligns with studies on blended learning that call for more online interaction and collaboration (Callan et al, 2015; Güzer & Caner, 2014; Toto & Nguyen, 2009). The Building students appreciated the flexibility to access, review, and revisit the online resources as often as they needed, hence a strong alignment to the time expansion ability (G3), and affording some learner control (G6). Designing more active engagement opportunities with the online learning resources may assist the less self-directed students to better prepare for class.

Participant comments suggest that interdependence of content between learning modes, or subject layering (G7), was achieved in the main. Some students indicated a lack of confidence in using the online resources to prepare for classes or assessments. Glazer included teacher presence in the subject layering characteristic of blended learning, indicating that teacher moderation and feedback should be present in both physical and online settings. In the Building model the teacher presence was more active in the physical environment. In the online environment it was only evident through the teacher narration of presentations. The student voice (G4) was not well represented online; student communications with teachers and student peers was almost non-existent, relying more on face-to-face or email contact. Garrison, Anderson and Archer (2000) advocate the need to establish and sustain teaching presence in the online learning environment as a key component to foster a community of inquiry. They add that online teacher presence can model behaviour and influence student behaviour, manage expectations, and supplement face-to-face learning. The authors of this study recommend emphasis on teacher presence, to draw it out as a discrete or eighth characteristic, to ensure explicit attention to both:

- G7. Subject layering: an interdependence between the learning environments so students experience layers of content by attending to both online and face-to-face learning.
- G8. Teacher presence: visible teacher presence in each of the learning environments, including interaction, moderation and feedback, modelling the supplementary value of each setting, and managing

student expectations regarding amount of online teacher presence and interaction (reinforcing Garrison et al (2000) emphasis on teacher presence).

The pedagogical approach overall (G1), while missing explicit and articulable theorising to underpin the design, was processed by the teachers in an action-research style of implementation and improvement cycles. The teachers, both in individual interviews and their collective team workshop, identified areas for improvement such as more interactivity in the online learning elements and revision of the role of the lecture in the blended learning model.

Conclusion

The authors of this paper consider that a blended learning subject design seamlessly and complementarily utilises the best attributes of both face-to-face and online teaching and learning environments. What constitutes the 'best attributes' of each environment depends upon subject-specific context, intended objectives, and access to technology and resources.

This paper explored a blended learning case via the interrelationships between the individual, team, and pedagogy enhanced by technology in the tertiary education context of a diploma in building and construction. This exploration was supported by capturing the views of the 'me' or individual student, teacher and technologist (via individual interviews and a student survey); the views of the 'us' or group (via group interviews with students and a teaching team workshop); and views of 'it' (pedagogy) and 'IT' (technology), that is, the blended learning pedagogical approach supported by technology.

The Building model was analysed in this paper via Glazer's (2012) seven characteristics of blended learning. Several characteristics were largely met; however, in the online learning environment the areas of active learning and communication require further attention. This study endorsed Glazer's characteristics as a framework to evaluate blended learning in tertiary education, while recommending the separation of teacher presence as a characteristic of its own.

A report was delivered to the owning school of the university listing recommendations for improvements to the model, as refined with the teaching team in the workshop-styled collective interview. At the time of writing no decision has been received regarding follow-up action. A perspective that remains to be explored is to situate this study on blended learning in the overall Diploma of Building and Construction in which the remaining 60% of courses are delivered using a traditional face-to-face pedagogy. Such an evaluation may illuminate

a wider view of how pedagogical layering occurs within and between blended and traditional subject areas.

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