A critique of blended learning: Examples from an undergraduate psychology program

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Abstract
The adoption of technology to a University curriculum is challenging and requires a complex blend with pedagogical components. The aim of this study is to examine how digital learning tools could enhance first year modules supporting blended learning approaches. Two psychology modules are used as examples to discuss two different blended approaches and study student engagement with learning process by exploring their performance on online activities under the perspective of module design, students' engagement with formative and summative assessments, and digital literacy. The digital learning tools that supported the two blended learning approaches were wikis, blogs, online tests. This investigation was conducted for two subsequent years in a UK Psychology School in which a large number of students were enrolled. The total number of students who participated in this investigation for the 2016-2017 academic year was 407 and for the 2017-2018 academic year was 405. In the first example, an academic performance comparison was conducted between the students who have been engaged with online formative activities and those students who have attended the face-to-face classes only in a transferable skills module. In the second example, a compulsory online continuous assessment process was followed to support a first-year psychology module aiming to enhance student learning on biology topics. This article discusses how students might engage with online formative and summative activities in association with their performance and how different assessment types alongside with the use of different digital learning tools might enhance blended learning environments. Findings of this study suggest that teachers should connect formative with summative assessments in order to increase student performance and they should consider blended learning approaches under the perspective of pedagogical principles and continuous assessment in order to increase student engagement with their learning process.

Keywords
Blended learning; Formative assessment; Module design; Student engagement; Summative assessment; Academic performance

1. Introduction

In a Higher Education learning environment, contact hours between teachers and students support face-to-face teaching modes with learning resources available to students through University Library and/or the School repository. Technology-Enhanced Learning (TEL) is defined as "the effective use of digital technologies to support learning and teaching" in order to provide students with an opportunity to "enjoy a more flexible learning experience" (Joint Information Systems Committee, 2014). The increasing availability of both hardware and software allows students and teachers to support a flexible learning approach (Gordon, 2014) increasing the teaching design opportunities for blended learning (Lai, Lam and Lim, 2016). Based on Boelens et al (2015), blended learning is an instructional approach that combines online and face-to-face instructional activities. Essential components of the blended learning approach are either any portion of student learning experience could deliver with online media or any teaching effort which aims to find students' individual needs so that instruction can be personalized. The Christensen Institute (https://www.christenseninstitute.org/blended-learning-definitions-and-models/) has described four models which support the 'blended learning' concept. The main characteristic of all these four models is that learning can be flexible in terms of time, place, learning path and pace. However, there is no specific framework for teachers to follow in order to implement their blended learning approaches (Boelens, De Wever & Voet, 2017). As a result, there is a difference between the way blended learning has been adopted by teachers in a local, national, and international context (Kirkwood & Price, 2014; Liu & Chen, 2018; Mykhnenko, 2016). Jones and

Bennett (2016) offers a definition of module design following blended learning paradigm, "the creation of context-sensitive learning habitats that cater to the differing needs of blended and online -only students, within a single pedagogical ecosystem" (p.1). Therefore, because of the lack of a standard framework, University programs integrate technology into their curriculum in different ways based on their own needs, resources, and staff beliefs (Galvis, 2018).

When teachers design their own modules, they tend to follow the model that the School curriculum has designed (Butcher, Davies & Highton, 2006). Biggs (1996a) introduced the outcomes-based approach (constructive alignment), as a course/module design process based on which learning outcomes are the indicators for the teaching approaches and assessment methods used. Through Biggs's (1996b) Presage-Process-Product (3P) model of teaching (Figure 1), a dynamic system is formed between student factors, teaching context, on-task approaches to learning, learning outcomes, which mutually interact (Biggs & Tang, 2007).

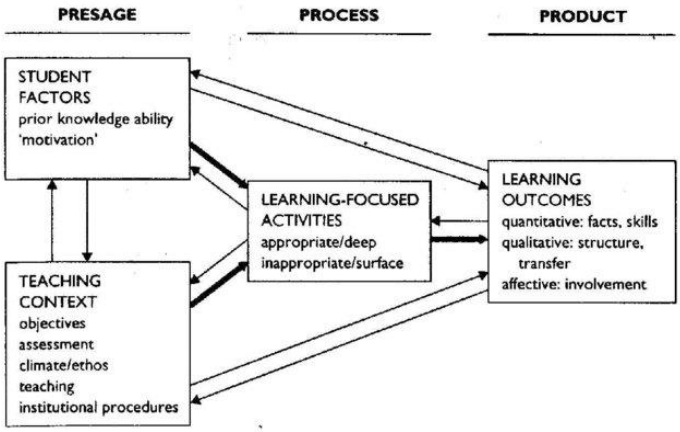


Figure 1: The Presage-Process-Product (3P) model of teaching and learning (Biggs 1996b, p.62)

Additionally, the module design process is influenced by national and/or international bodies/organizations which provide general guidelines based on the national education system and/or universal trends. For example, the UK psychology undergraduate programs are following the requirements of the QAA Benchmark Statement for Psychology (https://www.qaa.ac.uk/quality-code/subject-benchmark-statements) in order to satisfy the requirements for British Psychological Society (BPS) (appropriate professional body which confers Graduate Basis for Chartership- http://www.bps.org.uk/). The QAA subject benchmark statement for Psychology identifies the key skills that students need to develop over their studies in relation to the assessment methods: 1. Generic and 2. Subject-specific. The assessment methods that are recommended for Schools to support student generic skills are related to communication skills (written and verbal) and information technology skills, whilst in the case of subject-specific skills are related to biology and brain cognition. Academic literacies cover the way in which students engage with a discipline (e.g., psychology) or area of study, and how teachers assist them to facilitate this (Lea and Street, 2006). Many researchers have studied how to embed academic literacies within the curriculum supporting the writing cycle (Bastalich, Behrend and Bloomfiled, 2014; Benzie, Pryce and Smith, 2017; Murray and Nallaya, 2016). However, many other researchers have advocated the need for an educational change from the traditional teaching and learning approaches to be more interactive, active, and collaborative through the use of the digital environment in order to enhance digital literacy skills of students and to support the needs of the 21st century (Simpson & Obdalova, 2014; Leahy & Dolan, 2010). UNESCO (2004) has moved from the initial definition of *literacy* "as the set of technical skills of reading, writing and calculating" (p.6) to "the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts" (p.13). This change is in alignment with the changes that are required to move from the needs of the industrial society (20th century) to the use of the Internet and digital technology into our everyday lives in the 21st century. UNESCO's six basic competencies of digital literacy are accessing, managing, evaluating, integrating, creating, and communicating information. Secker and Coonan (2013) introduced a new practical curriculum framework to support University with the embedment of digital literacies into their

curriculum which is related to managing, presenting, communicating, and social dimension of information. Another framework has been introduced by Ng (2012) in which digital literacy results from three dimensions: 1. Technical (e.g., connection and use of devices and their peripherals), 2. Cognitive (e.g., ability to think critically in the search, evaluate and produce digital information) and 3. Social-emotional (e.g., ability to use the Internet for communication, collaboration and learning purposes). The UK Joint Information Systems Committee (JISC, 2014) has integrated all the above described models and has produced a digital literacy skills framework. It has defined digital literacies as "those capabilities which fit an individual for living, learning and working in a digital society" (http://bit.ly/2cc2ScL) The proposed framework identifies the overlap between six elements: 1. ICT proficiency, 2. Information, data and media literacies, 3. Digital learning and development, 4. Digital communication, collaboration and participation, 5. Digital creation, problem solving and innovation and 6. Digital identity and wellbeing. Figure 2 illustrates the aforementioned six elements.

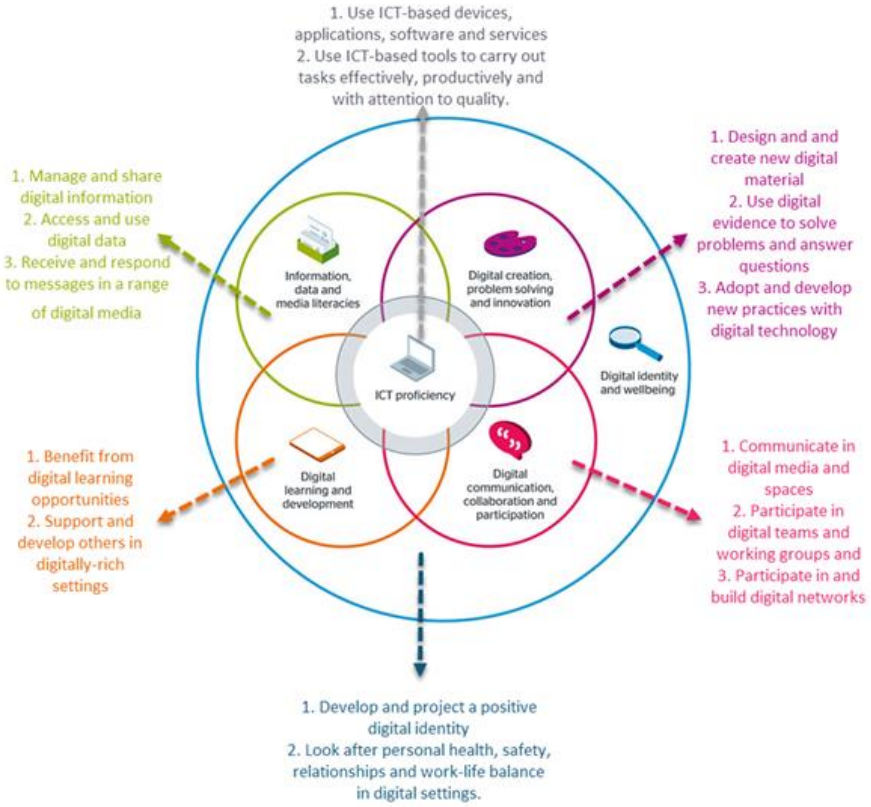


Figure 2: JISC developing students' digital literacy framework

The way that any of the above framework could be integrated into the teaching and learning process is related to blended learning approach, as it has been described above. Although some researchers have proposed structures to support the transition of learning from a face-to-face environment to a blended learning one, such as the Five Step Model (Salmon, 2000) and the Conversational Framework (Laurillard, 2002; 2012), all have advocated the importance of online interaction between students, teachers, and resources in order to support the construction of knowledge and skills. However, each discipline/each module combines the recommendations from national and international organizations, follow the teaching design frameworks, and adopt technology in their courses/modules in order to assist students to develop their own digital literacy skills (Watling, 2009).

The aim of this study is to examine how digital learning tools could enhance first year modules supporting blended learning approaches. Two practice examples from a UK School of Psychology are discussing two different blended learning approaches exploring student performance on online activities under the perspectives of module design, students' engagement with assessments, and academic and digital literacy. The first example examines a first-year module on transferable skills which combines online formative activities through wikis, blogs and online tests in order to support students to develop writing skills (generic skills). The

second example examines the association between online tests with the paper-based exams. The online continuous assessment was followed in order to support a first-year psychology module on the cognitive area of biology (subject-specific skills).

2. Methodology

2.1 Experimental Conditions and Participants

This investigation was conducted over the period of two academic years (2016-2017 and 2017-2018). The total of psychology students per academic year who was enrolled to the two modules (Transferable Skills and Biological Psychology) is illustrated in Table 1. Both modules were compulsory for the first-year undergraduate level of studies.

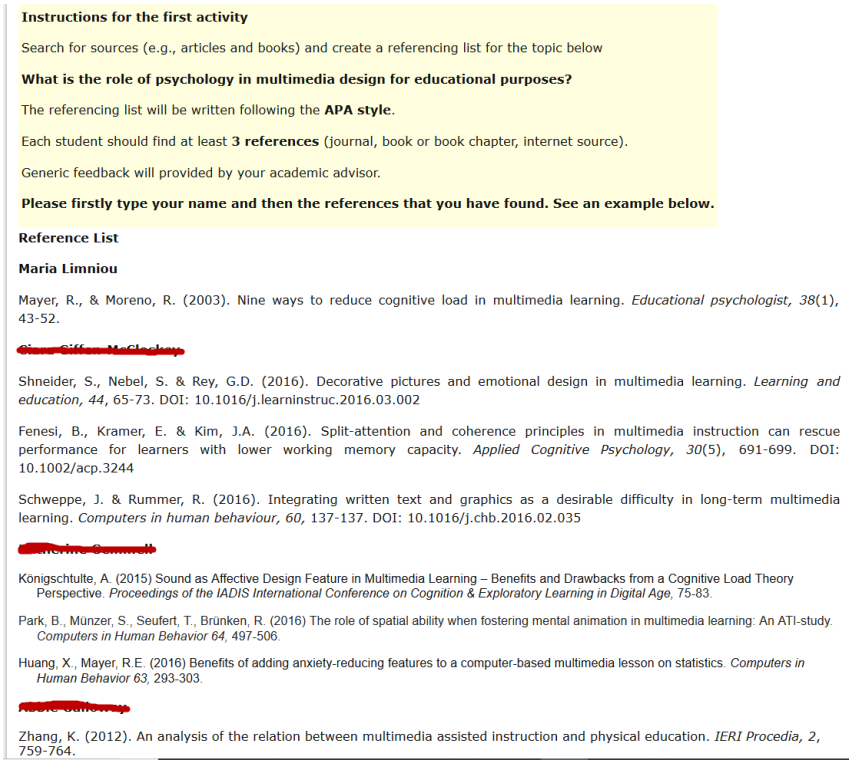
Table 1: The total number of students per academic year

Academic Year	First-year psychology students	Males	Females	Home students
2016-2017	407	51	356	398
2017-2018	405	53	352	395

2.1.1 Example 1: Transferable Skills-module design, technology integration and participants

This module involved fortnightly tutorial meetings between small groups of students and their Academic Advisor (AA) throughout the first semester (approx. 8 students/AA). The purpose of each meeting was for the AA to introduce students to some of the skills that were important in their degree and beyond, following the QAA recommendations. These included skills in research writing and referencing. Throughout their academic life, students need to discuss other researchers' work in order to support arguments by citing the appropriate references (academic literacies). The learning outcomes were to enable students to develop necessary referencing skills and to present research findings and arguments in an essay format. Students and AAs faced learning issues mainly because it was difficult to discuss and develop all the relevant skills in two tutorial sessions (1hour/session). Part of the summative assessment of this module was a referencing test, where students presented their ability to cite different sources by following the APA (American Psychological Association) Style and their ability to discuss a psychology topic in an essay format. By following the constructive alignment principles, AAs assisted students to develop these skills by covering different activities over each tutorial session. For example, AAs initially provided a title from their own research area and demonstrated to students how researchers could find journals, books, and other resources, and how these resources could be stored. After this initial activity, AAs discussed with their students how to reference in APA style and provided examples of how APA references should be presented within the context of a scientific document. In the second tutorial session, students discussed two introduction sections and two essay conclusion sections from two different essays in class. Students discussed the strengths and weaknesses of them as a group, the essay structure, and the argument development.

After each in-class session, students had the opportunity to participate in online formative activities by following a blended learning approach. The online activities covered similar topics to those that students discussed with their AAs in class. For example, in the first online activity the students should find at least three journal article, book, and/or conference references based on an essay title that were provided by their AAs. The reference list should be written in the APA style and they could collaborate with their peers through a group *wiki* activity by sharing references and creating a collaborative reference list (Figure 3). After the second tutorial session, an essay introduction and an essay conclusion example were provided as group *blog* activities. Students provided their comments underneath the blog posts. Finally, an *online practice test* was available for them in order to familiarize themselves with the type of questions that they should answer on their summative *online referencing test*.



Instructions for the first activity

Search for sources (e.g., articles and books) and create a referencing list for the topic below

What is the role of psychology in multimedia design for educational purposes?

The referencing list will be written following the **APA style**.

Each student should find at least **3 references** (journal, book or book chapter, internet source).

Generic feedback will provided by your academic advisor.

Please firstly type your name and then the references that you have found. See an example below.

Reference List

Maria Limniou

Mayer, R., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational psychologist, 38*(1), 43-52.

[redacted]

Shneider, S., Nebel, S. & Rey, G.D. (2016). Decorative pictures and emotional design in multimedia learning. *Learning and education, 44*, 65-73. DOI: 10.1016/j.learninstruc.2016.03.002

Fenesi, B., Kramer, E. & Kim, J.A. (2016). Split-attention and coherence principles in multimedia instruction can rescue performance for learners with lower working memory capacity. *Applied Cognitive Psychology, 30*(5), 691-699. DOI: 10.1002/acp.3244

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[redacted]

Königschtulte, A. (2015) Sound as Affective Design Feature in Multimedia Learning – Benefits and Drawbacks from a Cognitive Load Theory Perspective. *Proceedings of the IADIS International Conference on Cognition & Exploratory Learning in Digital Age*, 75-83.

Park, B., Münzer, S., Seufert, T., Brünken, R. (2016) The role of spatial ability when fostering mental animation in multimedia learning: An ATI-study. *Computers in Human Behavior 64*, 497-506.

Huang, X., Mayer, R.E. (2016) Benefits of adding anxiety-reducing features to a computer-based multimedia lesson on statistics. *Computers in Human Behavior 63*, 293-303.

[redacted]

Zhang, K. (2012). An analysis of the relation between multimedia assisted instruction and physical education. *IERI Procedia, 2*, 759-764.

Figure 3: Example on students' contribution in a wiki page.

Although the first-year students received a grade for their participation in each online activity, these were formative; therefore, their formative grade did not count towards their final module mark. However, students were informed that these activities would help them to assess their knowledge, practice skills, and to receive feedback in order to improve their academic performance. The aim of the types of online activities was to allow students to think metacognitively about the nature of writing an essay and the cognitive processes of the discipline (Cope et al, 2013), and to allow them to develop their digital literacy skills as they used a variety of digital tools. Table 2 illustrates the number of participants for each activity along with the number of students who were not engaged with the online process.

Table 2: The student rate (%) who participate in each online activity per academic year.

Academic Year	Wiki participation	Blog participation	Online practice test participation	No participation in any activity
2016-2017	42%	31.2%	39.3%	27.5%
2017-2018	50.1%	34.6%	45.7%	22.2%

2.1.2 Example 2: Biological Psychology – module design, technology integration and participants

The main aim of the "Biological Psychology" module was to introduce to first-year students the basic concepts and principles associated with Biological Psychology; in particular, the brain and its functions. In order to engage students with their learning process, the teacher followed a blended learning approach, where online voting platforms was used to support in-class discussions, and the lectures were recorded and uploaded on the module Virtual Learning Environment (VLE) space after the lecture. In addition to the streamed lectures, PowerPoint presentations were available on the VLE in two formats: a). complete, and b). with missing spaces to aid engaged note taking. Thus, students could fill the gaps on PowerPoint presentations and check their responses at their own time. Videos, a discussion board, and other supplementary material supported the student learning process both before and after the lecture time.

The summative assessment was a 2-hour Multiple Choice Test (MCT) under exam conditions (paper-based exam, weight 75%) and 1-hour of online tests (split into 4 smaller online tests, 15 minutes/per 12 question online test, weight 25%) spread over the 12-week semester. This module has been designed by following the constructive alignment principles and the continuous assessment process which can be defined as 'the use of

tests over a learning unit and the accumulation of results in a final grade' (Miller, Inrie & Cox, 1998, p. 34). Specifically, the online tests were available to the first-year students after lectures in weeks 3, 5, 7, and 9. Students had one-week time to revise the appropriate lectures and to complete the online tests, when they felt ready. There were five different types of questions included in each online test: multiple choice, matching, jumbled sentence, fill in multiple blanks and hot spot (Figure 4).

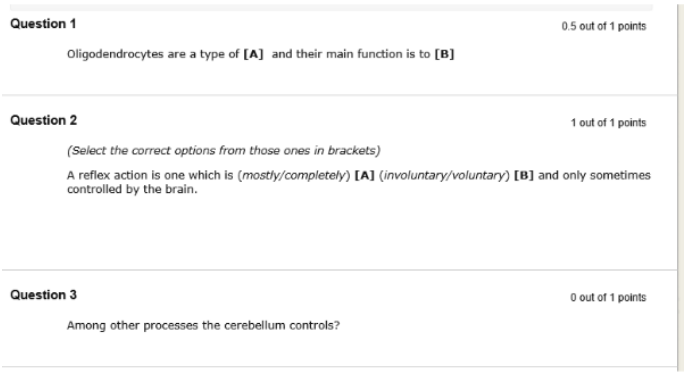

Figure 4A: A sample of the question statement and the score per question became available to students after the due date.

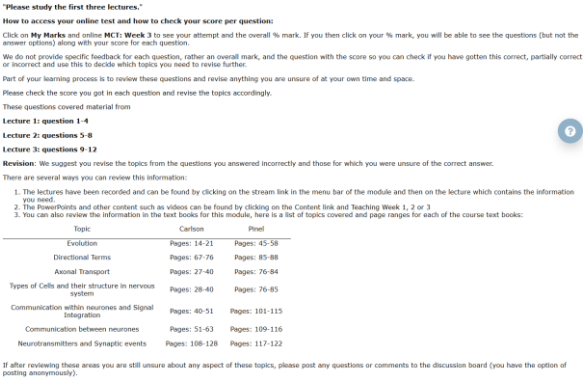

Figure 4B: An example of the overall feedback where the students should work out which topics they need to revise further based on their question grades.

There was a pool of questions for each lecture and the system delivered to students a random selection of questions so that each student to have a slightly different test. Students received feedback and grades after the due date of each online test allowing them to think more deeply about the meta-understanding of the cognitive topic and their own learning process (Bereiter, 2002). Table 3 illustrates the number of students who completed the four online tests over the semester and participated in the final MCT paper-based exam.

Table 2: The student rate (%) who completed the online tests (OT) over the semester for the two academic years.

Academic Year	OT 1 (Week 3)	OT 2 (Week 5)	OT 3 (Week 7)	OT 4 (Week 9)
2016-2017	98.5%	95.1%	89.9%	74.7%
2017-2018	97.8%	93.3%	86.9%	92.1%

2.2 Results

2.2.1 Example 1: Transferable skills

Grades (academic performance) on the essay were not significantly different between the two years so these data were analysed together. However, Table 3 illustrates the student essay grades per their participation in online formative activities for each academic year.

Table 3: The mean (±SD) values for the student essay grades after (non)participating in different online activities.

Academic Year	Wiki participation	Blog participation	Online practice test participation	No participation in any activity
2016-2017	62(±9.8)	67(±7.8)	59(±9.6)	56(±7.0)
2017-2018	63(±10.2)	65(±9.7)	61(±8.7)	57(±6.8)

A correlation analysis on student academic performance reveals if there is any association between the students who have been engaged with the online formative activities (e.g., wiki, blog and online practice test) and those students who have attended the face-to-face tutorial classes only. A Spearman's correlation showed a positive significant relationship with all three types of online activities.
Wiki: rs (.812) =0.330, $p < .001$ (low medium correlation)
Blog: rs (812) = 0.394, $p < .001$ (low medium correlation); and

Online practice test: rs (812) = 0.161, p <.001 (a very weak correlation).

A simple regression was run to examine the effects of the activities cumulatively. In the case of the essay, the number of activities undertaken significantly predict 12% of the variance in essay grade, R^2 =0.124(810), β=0.353, p <.001. Logistic regression was run to examine the effects of participating or not in each of the three tasks (referencing test, blog, and wiki) on the student performance on essay.
Wiki: The model explained 19.0% (Nagelkerke R^2) of the variance in essay grades and correctly classified 54.0% of cases.
Blog: The model explained 19.0% (Nagelkerke R^2) of the variance in essay grades and correctly classified 67.0% of cases.
Online practice test: The model explained 20.0% (Nagelkerke R^2) of the variance in essay grades and correctly classified 57.0% of cases.
Thus, each of the three activities predicted higher grades in the essay, with broad participation showing the strongest association.

Grades on the summative referencing test were found to be significantly different between the two years so are addressed separately in the analysis. A Spearman's correlation showed a positive association between taking the online practice reference test and the grades on the summative reference test (Table 4).

Table 4: The mean and standard deviation (±SD) values for the referencing grades along with the correlation results per year.

Academic Year	Mean(±SD)	Correlation values	Category
2016-2017	68(±18.1)	r_s (407) = 0.329, p <.001	weak correlation
2017-2018	72(±17.6)	r_s (405) = 0.500, p <.001	medium correlation

2.2.2 Example 2: Biological psychology

In both academic years, each of the online test (OT 1, 2, 3, and 4) showed a medium correlation with the final MCT exam. Table 5 illustrates the correlations between each online test with the final MCT exam per each year. Overall, there was no significant difference between test performances for the two years.

Table 5: The mean and standard deviation (±SD) values for each online test (OT 1, 2, 3, and 4) along with the final exam grades (Pearson's correlation coefficient-(r)).

Academic Year	OT1		OT2		OT3		OT4	
	Mean (±SD)	r	Mean (±SD)	r	Mean (±SD)	r	Mean (±SD)	r
2016-2017	59(±17)	0.287	65(±19)	0.324	61(±20)	0.382	57(±19)	0.483
2017-2018	57(±18)	0.429	71(±16)	0.378	64(±18)	0.423	63(±19)	0.440

3. Discussion

In this article, two examples in which blended learning approaches are used in 2 different ways, including different digital learning tools in order to assist students to develop generic and subject-specific skills have been discussed. The two modules on transferable skills and psychological biology followed the 3P framework in order to associate the learning outcomes and activities with assessments. In both examples, the online student participation and their performance (two student cohorts for two subsequent academic years) were examined as indicators of the student learning progress in a blended learning environment.

The first-year psychology students had the opportunity to participate in online formative activities, such as wiki, blog and practice, in order to enhance their (academic and digital) skills and practice themselves in areas related to their summative assessment. The online activities replicated the activities that they followed in class but in an online format. Based on the results, student participation in online formative activities offered a higher grade on their summative assessment. The benefit was cumulative and the more online activities students participated in, the more likely they were to get a higher grade. This suggests that engaged students who had taken part in digital activities were significant more likely to perform better than those who did not participate. However, as these online activities were formative (without being compulsory and gaining grades), the student rate which would act as an engagement indicator with the learning process outside the tutorial

classes was no more than 50.0% per activity. On the contrary, the rate of students who participated in each online test on the biology module was high (at least 75% per activity), as their grades contributed to the final grade for this module (summative assessment). This last point led to the argument that online activity which might not contribute to the final module grade might not achieve the optimum student rate participation. Additionally, the relationship between the students' performance on the module summative assessment with their engagement with the online activities was examined. Similar with the case of the transferable skills, the relationship of each online activity with the final grade was medium. Although this point is in alignment with other researchers' work related to formative assessment (Furtak et al., 2016), it also provides evidence that teachers should provide grades for student participation in online activities (combining formative with summative assessment) in order to enhance their learning process "forcing" to participate in the online activities through the gaining grades process. Although the contribution of online activities in both blended learning approaches was similar to the student final summative assessment, it seems that students preferred their participation in any type of online activity to have a direct impact on their grades (as evidenced by the second example) and not to spend time on activities without gaining a grade for their learning effort (as evidenced by the first example) just reflecting on the feedback which received from their teachers and/or their peers.

The described examples represent how blended learning environment might influence on student learning regarding their performance by following design recommendations from the Higher Education institutions, organizations, and professional bodies. Although these examples were related to psychology, the general design and pedagogical principles are the same to other disciplines as well. For example, studying digital literacy as described by JISC (2014), it is obvious that apart from the interactions between the learning material and teachers, students should develop digital skills through their interaction with their peers, devices and the outside world (out the class walls). In the first example, teachers used blogs, wikis and online test as part of the formative assessment process in order to allow students to communicate with each other through the use of different software and devices enhancing their collaboration skills. Theoretically, by following this approach students could enhance their digital literacy skills along with their learning, as they could learn "anywhere, anytime and anyhow". However, in reality as these online activities were part of the formative assessment process, there were a substantial number of students (approx. 22%) who did not participate in any of them. In the second example, teachers allowed students to complete the online tests anytime (within the period of one week) and anywhere they wished (in and outside campus). They received the feedback along with the grade for their participation in each online test after the due date. By studying the teacher perspective, student participation in online wiki and blog activities is more demanding than online test, as they need to read student comments/posts and provide more personalised feedback. Although this is potentially a more effective process in supporting student learning by not making use of formative opportunities, students preferred to focus on online activities which have a grade attached to the academic performance. This is an issue that teachers need to take into their account before designing any module.

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