Institutional adoption of blended learning on a budget

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Abstract
Purpose – This research paper aims to explore blended learning implementation in universities that are on a low budget, essentially determining the more important steps to invest during the initial stage of implementation and investing in costly IT infrastructure or training faculty for student-centred learning and relevant pedagogies.
Design/methodology/approach – A survey of 254 students at the University of Jordan (UJ) has been administered. Student satisfaction with blended learning is related to the two main variables of IT infrastructure and teacher training for blended learning strategies.
Findings – The results indicate that faculty training has a significantly higher impact on predictability of satisfaction than IT infrastructure. Therefore, low-budget institutions should focus first on helping instructors shift to student-centred styles of pedagogies before making large investments in IT infrastructure.
Research limitations/implications – Because of the fact that the chosen setting did not completely lack IT infrastructure, the results may need to be retested with at least two individual institutions, one where advanced IT infrastructure is available and one where it is completely lacking. More can also be done to vary the limited location of the study.
Practical implications – This paper suggests that making costly investments into technology is not a necessary first step during the initial stages of blended learning adoption in developing countries.
Originality/value – This paper addresses the need for more research on blended learning adoption in developing countries with scarce finances and lack of resources sufficient to achieve faculty training and IT infrastructure improvement together. Several universities make costly investments only to lack sufficient blended learning pedagogies which often results in failed blended learning implementation.
Keywords Blended learning, Higher education, Faculty training, Infrastructure
Paper type Research paper

1. Introduction
Higher education institutions around the world are feeling the pressure and burden of the 21st century need for graduates who are well equipped with skill sets adequate for the fourth industrial revolution. Critical thinking skills, collaboration and self-enhancement/learning capabilities are among the main skills needed to succeed in the coming job market. A student-centred learning environment helps students learn how to develop their own personality and abilities and, at the same time, search for the information needed and acquire it; a skill much of the job market will be looking for. Some might argue that universities need to change nothing, as such skills could easily be acquired using the traditional face-to-face teaching methods that have been used for centuries. The problem with such an argument is that countless studies have shown that a learning model that is more student-centred resulted in higher
achievement scores for students, achieved more effective learning and enhanced student-centred learning (Lipman, 2001; Lu et al., 2009; Peroz, 2009; Wang, 2010; Gerdprasert, 2010; Flowers, 2011; Arroyo–Morales et al., 2012; Brierton, et al., 2016). Moreover, countless articles have discussed the drawbacks of traditional, teacher-centred learning, citing one such related factor; namely that traditional learning, in general, is not student-centred; particularly, it produces students who heavily rely on the instructor and who are not capable of self-learning and knowledge enhancement on their own (Grandzol, 2004; Dabbagh and Ritland, 2005; Ferreri and O’Connor, 2013). This situation has forced some higher education institutions around the world to rethink the traditional learning approaches at hand and substitute it for a more technology-enhanced and student-centred learning environment (Garrison and Kanuka, 2004; Sife et al., 2007; Harahap et al., 2019).

We can observe, then, that switching to technology-enhanced, student-centred learning does create a strategic and vital turning point for higher education institutions. This might be simple for some institutions with the financial capabilities available. However, universities in the developing world are not exempt from this pressure (Masters and Ellaway, 2008; Kwofie and Henten, 2011; Andersson and Grönlund, 2009; Pagram and Pagram, 2006; Tarus et al., 2015; Ssekakubo et al., 2011). They, too, feel the need to quickly change to a more technology-enhanced learning environment (Sife et al., 2007). Such a change could be accomplished via online/Web-based learning or through blended learning. Most universities choose blended learning for several reasons, particularly because it brings forth the best of both worlds (traditional face-to-face and online learning) (Dowling et al., 2003; Heba and Nouby, 2008; Jones and Chen, 2008; Woltering et al., 2009; Lim and Morris, 2009; Hughes, 2007; Azizan, 2010). Blended learning combines face-to-face lectures with online student-led activities and thus reaps the benefits of both learning models (Graham, 2006; Zacharis, 2015). Blended learning helps to circumvent online learning disadvantages, such as lack of face-to-face communication, and also helps eliminate the most common traditional learning disadvantage; namely a non-student-centred (teacher-centred/teacher-led) method (Yılmaz and Orhan, 2010; Hsu and Hsieh, 2011; Vernadakis et al., 2011).

The implementation of any blended learning design requires, among many other things, two essential components: IT infrastructure and well-trained faculty (i.e. faculty training regarding blended learning student-centred pedagogies/methods and use of technology) (Sife et al., 2007). In particular, some universities begin by investing large sums of finances in IT infrastructure such as increased bandwidth, high-end subscription, servers, SMART Boards, projectors, Wi-Fi enhancement, learning management systems (LMSs), IT support and more. Faculty training involves such elements as training faculty on how to use the new infrastructure and also training faculty on the differences in pedagogical methods associated with blended learning.

The main concern is that, in some cases, untrained faculty may think that they are already implementing blended learning just because they have some material available for students online. Some definitions of blended learning would allow for that, as they define blended learning as basically the use of technology with traditional learning (see, e.g. Graham, 2006). Other definitions suggest that blended learning is the combination of the best practices from both traditional and online learning (i.e. including student-centred learning from the online learning component) (see, e.g. Driscoll, 2002; Harvey, 2003; Finn, 2004). This research focuses on the implementation of blended learning at the University of Jordan (UJ), which, like many universities in the developing world, suffers from a shortage of allocated finances for blended learning adoption on the institutional level. The definition most resembling the UJ’s vision of blended learning is the latter. With that being the case, faculty training in this regard requires not only technology training, but training aimed at producing student-centred learning and creating instructors who are guides and mentors, not simply delivering knowledge in a teacher-centred fashion (Marks, 2005; Eom, 2006; Peltier, 2007). It involves the understanding
of other various learning models, other than the objectivism model commonly used in traditional learning. Such models include collaborativism and/or constructivism (Leidner and Jarvenpaa, 1995).

Returning to the main aim of this research, the problem faced by most universities in developing countries is that both IT infrastructure and faculty training require financial resources and/or time, respectively, the former of which they especially lack (Ssekakubo et al., 2011; Frehywot et al., 2013; Tshabalala et al., 2014; Ali et al., 2018). The financial burden of IT infrastructure is not the only problem, however. It has been cited in a number of studies concerning barriers to the adoption of blended learning by faculty that training is one of the main concerns (Sife et al., 2007; MacKeogh and Fox, 2008; Porter et al., 2014, 2016). In particular, faculty repeatedly claim lack of time to train for blended learning pedagogies and the use of new technologies. Universities, as well, claim the need to locate expert trainers and find methods of motivating faculty to participate.

This research addresses this problem faced by higher education institutions in developing countries, taking Jordan as a case study, and the UJ as a prime example, with respect to the adoption of blended learning. Some universities which lack sufficient funds consider the question of which is more important during the first phase of adoption of blended learning on an institutional level: training of faculty or expensive IT infrastructure. This question comes to mind when an institution can only allocate enough funds for one, or the other, at any given moment.

2. Review of related literature
2.1 Defining blended learning and its demand in higher education
Blended learning, also known as hybrid or mixed learning, comes in several different forms based on the definition one adopts for it. The literature does not agree upon one definition for blended learning. For example, Graham (2006, 2013) suggests that blended learning is a combination of traditional learning and online learning; Finn (2004) and Boelens et al. (2015) suggest that it is the mixture that reaps the benefits of traditional and online learning, leaving aside the problems that each face (as discussed earlier). Location, on the other hand, is not always discussed in the literature. According to Driscoll (2002) and Harvey (2003), blended learning may be considered blended learning even if it takes place completely in the classroom, taking into consideration that a portion of class work is performed by the student using online tools in classrooms. On the other hand, Boelens et al. (2015) offer a definition of blended learning which implies a reduction of face-to-face class time. Whether blended learning necessarily means student-centred learning is also a matter of which definition we choose to adopt. For instance, Lotrecchiano et al. (2013) recognise a mix of structured and unstructured learning. This will make a huge difference in terms of whether the learning process is student-paced and whether it is student-centred; one can assign tasks for students to complete online, but the difference is in whether these tasks are a completion of lessons learned in class or whether they are the first source of information the student has to learn from (i.e. flipped classroom design). The fact that there is variety in the definition of the term blended learning in the literature has forced some institutions to tailor their own definitions to fit their particular institutional goals, as will be discussed further (Graham, 2013).

With respect to how popular blended/hybrid learning adoption in higher education institutions has become, we find that the answer is not as clear as we would hope. In particular, Graham (2013) suggests that institutions around the world adopt their own specific tailored definition of blended learning, which makes it even more difficult to calculate exact figures of adoption (Oliver and Trigwell, 2005 as cited in Graham, 2013); one example concerns how much is to be taught online and how much is left for in-class sessions (Graham, 2013). Norberg et al. (2011: 207) refer to blended learning as the “new normal”, highlighting the
increased adoption of blended learning lately. Dziuban (2018) cites a few statistics regarding the extent of adoption of blended learning, which vary quite a bit, again, due to the varying definitions of what is, and what is not, considered blended learning: 65.2% nationwide according to the Online Learning Consortium, but only 35% according to the U.S. Department of Education, which takes a reduction in class time to be their standard for what blended learning is.

2.2 Factors involved in blended learning success

With respect to challenges arising with blended learning adoption, Ma’arop and Embi (2016) conducted a review of literature over the past decade and found that the challenges most faced during the implementation of blended learning were classified into four main sources: institutions, students, instructors and technological factors. This section details the theoretical background necessary to arrive at the two main variables in this study, which are infrastructure and faculty training in achieving successful implementation of blended learning as assessed through student satisfaction. This research framework depends mostly on the six dimensions for perceived e-learning satisfaction of Sun et al. (2008).

2.2.1 Effect of infrastructure quality on student satisfaction. Sun et al. (2008) mention six dimensions necessary for student satisfaction with e-learning: learner dimension, instructor dimension, course dimension, technology dimension, environment dimension and design dimension. Sun et al. (2008) suggest that the technology dimension is related to the quality of technology used, along with the quality of the Internet itself. Accordingly, better infrastructure is seen to increase student satisfaction with blended learning and hence, increase success rates of implementation. The technology dimension can be seen as the first variable of this study, namely infrastructure. Apart from quality of technology and Internet is the perceived ease of use and usefulness of such technology (the design dimension). The design dimension and the technology dimension are taken jointly in this study to represent the first variable, namely infrastructure, and more precisely, investment in quality and modern infrastructure.

2.2.2 The importance of faculty training. The second variable of the study is faculty/instructor training. For this variable, we group together the remaining dimensions mentioned in Sun et al. (2008), also repeating another understanding of the design dimension. Here again, we can find the design dimension when we consider that it is the instructor’s responsibility to help make the technology available seem easy to use. This is in close connection to the learner dimension (learner attitudes towards computers, technology anxiety and Internet self-efficacy) where the instructor may play a part in reducing learner computer and Internet anxiety by providing orientation to students at first and then gradually guiding them through the process. This can be seen as a barrier to student satisfaction with blended learning if students are not adequately technologically equipped or if they have anxieties towards it (Sun et al., 2008).

The environment dimension involves diversity in assessment and learner perceived interaction with others. Instructors are once again taken in this study to be responsible for this dimension. In essence, instructors must diversify their assessment measures and should know that this is a must in blended learning (at least in light of Sun et al.’s six dimensions); for instance, online assignments and online discussion forums could be used in the same course. The instructor dimension has to do with the instructor’s response timeliness and attitude towards e-learning. Instructors are expected to have positive attitudes towards the e-learning portion of the course and are expected to answer student queries in a timely, agreed upon, fashion. Last but not least is the course dimension relating to course flexibility and quality.

As can be seen from the previous discussion on the six dimensions of Sun et al. (2008), it is obvious that blended learning puts greater workload on the instructor than traditional
approaches. According to studies reported in Ma’arop and Embi, instructors have to deal with immense challenges ranging from “increased workload, increased time devotion, lack of skills to conduct blended learning and difficulty in finding the right blend for their curriculum” (Ma’arop and Embi, 2016, p. 48). This can also be seen from the previous section detailing the responsibilities of the instructor (see Sun et al., 2008) which, if done correctly, will help ensure student satisfaction with blended learning. According to Ma’arop and Embi (2016), the difficulties faced by instructors looking to implement blended learning are summarised as (1) increased workload necessary to prepare and manage a blended learning course, in terms of preparing uploaded material, following up with students’ online work and evaluating student progress (Alebaikan and Troudi, 2010; Heaney and Walker, 2012; Gedik et al., 2013); (2) lacking the sufficient pedagogical background and instructional design frameworks necessary to successfully outline a blended learning course that is capable of also achieving student-centred learning and harmonising the online portion with the in-class portion of the course (Alebaikan and Troudi, 2010; Gedik et al., 2013; Lotrecchiano et al., 2013); c) lacking the technological competency necessary to manage the online portion of the course on the LMS (Alebaikan and Troudi, 2010). The solutions mentioned for such problems associated with faculty in the literature suggest that faculty be given orientation and training (both pedagogical and technological) prior to implementation (Alebaikan and Troudi, 2010; Kenney and Newcombe, 2011). Ramos, Taju and Canuto (2011) mention an additional challenge with respect to faculty, namely that some are unwilling to be trained. The solution suggested, nevertheless, is making training obligatory prior to implementation.

2.3 Summary
Although the aforementioned studies bring to light the notions of infrastructure, faculty training and student satisfaction, none have conducted a study as the present study, where the former two factors are taken into consideration together for the sake of prioritising one over the other. Some studies cite the importance of training (Alebaikan and Troudi, 2010; Gedik et al., 2013; Lotrecchiano et al., 2013), others recommend good infrastructure before adopting blended learning (Sun et al., 2008; Graham, 2006; Graham et al., 2013), while some cite the need for a successful blended learning implementation (Graham, 2006, 2013), but none have connected all of them together with the sole purpose of finding out which of these factors is most important when the institution is on a tight budget and cannot afford to have both quality faculty training and quality infrastructure at the same time. This is what this paper addresses in particular.

3. The University of Jordan’s blended learning initiative
3.1 Background
The UJ was the first established university in Jordan. At the time of the study (2018), the university had approximately 42,000 students (currently 50,000) and 26 faculties. Faculty members at UJ are among the best educated in Jordan. Ever since the financial crisis of 2008, the university has been suffering from a lack of funds and the proper financial backbone to help it excel in its endeavours. The university is also infrastructure burdened, with slow Internet, not accessible in all locations, an outdated LMS (older version of Moodle) and technologically poor classrooms. Basic IT infrastructure exists, but is in need of a large-scale update; servers cannot bear the load, computers need updating and more than 85% of classrooms lack any source of technology (projectors, Internet access, SMART Boards, computers, speakers, clickers, etc.). The university has a dedicated LMS (Moodle), but is an older version which lacks much of the needed functionality and cannot bear the load of uploads if necessary due to a lack of dedicated LMS servers.
The lack of financial resources and the burden to admit more and more students each year (as it is the most popular university in Jordan) have shaped one of the university’s strategic goals to be a university which produces graduates who are employable in the 21st century, yet at the same time, benefiting from technology in order to reduce running costs, namely via adopting blended learning. With respect to producing 21st century graduates, the university adopted its own form of blended learning. Blended learning at UJ had a philosophy behind it, namely that we must shift from teaching to student-centred learning where students become more in charge of their learning process and as such become more independent thinkers and learners. Flipping the roles of the teacher and the student was necessary. Students are now expected to learn the material by themselves, at home, then participate in class discussions about the topic during the following class meeting. However, this would not be possible given that more and more students nowadays are taking up part-time jobs along with studies. More time was needed to be given to students to complete such tasks at home. This is where the idea of blended learning with a reduction in class time first appeared in the university. The ratio was 2:1 (in-class, online). This was also thought to help the university overcome the burden of high running costs in the future as blended learning becomes more widespread in the university.

3.2 Addressing blended learning success factors by the university prior to implementation

The idea of adopting blended learning came as an institutional initiative, but, still, was not rushed; the university started with only one class being taught and managed carefully to assess the success rate of the idea, then proceeded to expand by adding a few more faculty members and courses each semester. “Transitioning to the blended learning model should be carefully managed to ensure that both students and faculty are ready and receptive to this approach” (Napier et al., 2011, p. 20).

The method used to circumvent lack of proper infrastructure was to design blended learning courses which were carefully thought out in terms of which tasks were to be performed by students as the online component and those which were relegated to face-to-face meetings in class. This helped quite a bit, as now faculty could design the online portions of the course to be done at home by the student, thus putting less of a strain on the weak IT infrastructure on campus. However, deciding which tasks were to be performed online (as mentioned in the previous section) constitutes one of the obstacles that the literature cites as facing faculty wishing to adopt blended learning. Instructors at UJ are expected to develop their own courses, either totally from scratch or by making use of open educational resources.

Given these aforementioned obstacles (see section 2), the university sought to address them early on by introducing training for faculty wishing to adopt blended learning, before they were allowed to start with such a course.

In general, faculty require two main parts during training, namely new tools and new mind-sets (DeLacey and Leonard, 2002). Technology know-how alone does not ensure successful implementation of blended learning (Kember et al., 2010; Coccoli et al., 2014), instructors also need to know how to create active learning environments (pedagogically speaking), as well (Kember et al., 2010). With respect to faculty training, those who are not trained are expected to lack some of the components necessary for student satisfaction mentioned earlier; namely they may lack proper design, technology skills and instructor blended learning pedagogies. Moreover, they are expected to lack proper harmonisation of introducing technology with (as discussed earlier) the learner dimension, namely learner anxiety and Internet self-efficacy. Although undergraduate students nowadays are considered technology native (Ting, 2015), they still face difficulties in making use of technology effectively (Tang and Chow, 2016). Students may need to be guided in the beginning to effectively shift their mentality from receptive to participant and scrutiniser in
the learning process (Greene et al., 2014). The solution from the UJ was to create, then circulate, a blended learning guide, published in both English and Arabic, and administered online to students by the instructor prior to the beginning of class sessions (as soon as they are enrolled in the class). Students were also encouraged to watch online videos about how to use Moodle. In terms of student responsibilities during the course, students were given a brief orientation about what is expected of them and their responsibilities towards the blended learning course during the first class meeting of the semester. A syllabus was also circulated to students enrolled, detailing the outline of the course and the rules, regulations and deadlines expected of the students.

Faculty training at UJ, thus, consisted of pedagogical and LMS (technology use) training. In particular, trained faculty learned about blended learning and student-centred approaches in general, including proper blend ratio, how to design a flipped classroom to create a more student-centred learning environment, how to assess student work, how to create a detailed course outline illustrating class work and online work clearly and so on, followed by regulatory training on UJ’s institution-specific idea of blended learning. Though the definition of blended learning in the literature may be somewhat forgiving, the specific requirements of UJ’s blended learning program are much more demanding and incorporate flipped classrooms in the blend; blended learning at UJ must start with the student at home watching a video about next week’s topic, answering assignment questions, submitting before next week’s class, then participating in a class discussion about the same topic. Instructors are expected to grade weekly assignments on the LMS, taking into consideration that they vary such assignments in order to address the environment dimension (for instance, written assignments and discussion forum participation), along with the usual midterm and final examinations. Such tasks required of instructors, of course, necessitated training faculty on the use of the LMS itself (Moodle). The training course was 18 h long, broken down into 9 h of LMS training and 9 h of pedagogical issues and institutional regulations regarding blended learning implementation and was administered over three days.

4. Methods

4.1 Objectives

As mentioned earlier, those universities which lack sufficient funds consider the question of which is more important during the first phase of adoption of blended learning on an institutional level: training of faculty or expensive IT infrastructure. The UJ provides a rich ground for such an investigation as the two environments exist at the same time. Given the circumstances of new policies being advent in such a large institution, some faculty members began a blended learning course without receiving proper training for blended learning and in some cases without any training whatsoever, while others participated in university-organised faculty training for blended learning before starting their blended learning course. The existing environment in the UJ is one where the standard is poor blended learning infrastructure for all (students and faculty), but with another variable that is not the same for all, namely training of faculty. As mentioned earlier, this provides a fertile ground to test which is more important in the initial stage of institutional adoption of blended learning, faculty training or investment in IT infrastructure. This research consequently seeks to answer the following research questions.

RQ1. Which has a greater impact on the success of a newly adopted blended learning strategy on the institutional level in the initial stage of implementation, investment in costly infrastructure or investment in faculty training?

It is also important to explore to what extent each of these variables can predict future student satisfaction regarding blended learning. Therefore, the following question is posed.
Given that the implementation of BL in UJ is in its testing phase, we are faced with some external variables which may affect the results, as listed as follows.

1. Study level: Will study level affect the results, that is, will we find that, for instance, senior students have different satisfaction levels with blended learning then, say, sophomore students?

2. GPA: To what extent are satisfaction levels based on student’s academic achievement as assessed by their GPA, that is, since blended learning requires more work on the part of the student, will we find that, for instance, higher achieving students will favour blended learning more than those with lower GPAs?

3. Prior enrolment: This addresses the difference which may exist between students regarding whether they had experienced a blended learning course before or not. In particular, taking your second blended learning course may be easier than taking your very first one, since the very first blended learning course may have been taken as a new experience which puts more workload on students and thus may affect their satisfaction.

To account for these variables, the following question is put forth.

4. RQ3. What is the predictability of study level, GPA and prior enrolment in BL courses on student satisfaction?

4.2 Materials and procedure

A questionnaire was distributed to students using a link leading to a questionnaire prepared on Google Forms along with the presence of support from survey takers. The link was shortened using tinyurl.com and written on the board for students to follow using their mobile phones. Only those interested in taking the questionnaire did so. Survey takers approached students at the beginning of their lecture (survey taker was not the same instructor for that lecture) and asked that students be completely honest with their answers and that anyone not interested in taking the survey had the right not to; this was to ensure that students did not randomly choose answers in the questionnaire just to get it over with. The questionnaire consisted of the following types of questions, broken down into the following groups, as shown in Table 1.

4.3 The study sample

The study sample consists of (254) male and female undergraduate students (ages 18–25) from the Faculty of Foreign Languages, an age group which Coccoli et al. (2014) mention could require more technology-based pedagogies and learning styles. This number represents the total number of students who took the survey, as those who were not interested in taking the survey were not forced to. Therefore, those who did fill out the questionnaire did so completely, with the support of survey takers. The Faculty of Foreign Languages, in particular, was chosen because it was the first faculty to introduce blended learning. Therefore, this faculty has the largest number of students with blended learning exposure in at least one course within the faculty. It was also the only faculty, at the time, to have multiple faculty members teaching using the blended learning method. Only those students enrolled in a blended learning course at the time were asked to fill out the questionnaire, which was distributed during the last week of the Fall 2018 semester, to ensure that students had enough exposure to the course being taught as
blended learning. Students, therefore, had all been exposed to blended learning for at least one semester. As the researchers are the first in the university to apply blended learning, they were asked to help train others and were responsible for managing blended learning expansion within the university. Therefore, with respect to the instructors involved in teaching these courses, the researchers had prior, detailed knowledge of how many faculty members have adopted this method, and of those applying blended learning, how many, and who exactly, were trained and how many were not. Such information was taken into consideration in the choice of which classroom to visit to distribute the questionnaire (i.e. trained and untrained faculty applying blended learning). Table 2 shows the distribution of the sample according to the study variables.

5. Results
In order to verify the reliability of the sample, the stability coefficient was determined through internal consistency using the Cronbach alpha coefficient equation. The stability coefficient was (0.901), which is considered high and an appropriate value that indicates the stability and reliability of the scale.

5.1 Results for RQ#1–2
This section provides the analysis of the results obtained concerning research questions 1 and 2, repeated further for convenience.

RQ1. Which has a greater impact on the success of a newly adopted blended learning strategy on the institutional level in the initial stage of implementation, investment in costly infrastructure or investment in faculty training?
RQ2. What is the predictability of training and that of infrastructure on student satisfaction?

To study the predictability of training variables and infrastructure for the ratio of satisfaction, the correlation between satisfaction, on one hand, and training and infrastructure, on the other, was calculated. The following table presents the results.

As shown in Table 3, there is a statistically significant correlative relationship between training and satisfaction. The coefficient of correlation between infrastructure and satisfaction is (0.247) and between training and satisfaction, it is (0.535), which is statistically significant. The positive correlation indicates that an increase in the degree of infrastructure and training leads to an increase in the level of satisfaction.

To determine the ability of the two variables (infrastructure and faculty training) to predict satisfaction, a multiple regression analysis was performed in a stepwise manner. The following table shows these results.

Table 4 shows that the predictability of training was statistically significant. Training accounted for 28% of the degree of satisfaction for students. The table also shows that when adding the infrastructure variable to the predictive model of students' satisfaction, it accounted for 31% of the degree of satisfaction. This implies that satisfaction adds 3% of the variation. This is statistically significant, indicating that the variables have the ability to predict the degree of satisfaction. However, training is more important, as it accounted for 28% of the variation of satisfaction. The infrastructure only accounted for 3% of the degree of satisfaction.

Table 2.
Frequencies and percentages of the study sample given the study variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>State</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction with BL course</td>
<td>Satisfied</td>
<td>194</td>
<td>76.4</td>
</tr>
<tr>
<td></td>
<td>Unsatisfied</td>
<td>60</td>
<td>23.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>254</td>
<td>100.0</td>
</tr>
<tr>
<td>Study level</td>
<td>First year</td>
<td>72</td>
<td>28.3</td>
</tr>
<tr>
<td></td>
<td>Second year</td>
<td>26</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>Third year</td>
<td>66</td>
<td>26.0</td>
</tr>
<tr>
<td></td>
<td>Fourth year or more</td>
<td>90</td>
<td>35.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>254</td>
<td>100.0</td>
</tr>
<tr>
<td>Prior enrolment</td>
<td>Yes</td>
<td>177</td>
<td>69.7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>77</td>
<td>30.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>254</td>
<td>100.0</td>
</tr>
<tr>
<td>GPA</td>
<td>Excellent</td>
<td>37</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>very good</td>
<td>101</td>
<td>39.8</td>
</tr>
<tr>
<td></td>
<td>good</td>
<td>81</td>
<td>31.9</td>
</tr>
<tr>
<td></td>
<td>Satisfactory</td>
<td>35</td>
<td>13.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>254</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 3.
A Pearson correlation coefficient between infrastructure and training with satisfaction

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pearson correlation</th>
<th>Sig. (two-tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>0.247**</td>
<td>0.000</td>
<td>254</td>
</tr>
<tr>
<td>Training</td>
<td>0.535**</td>
<td>0.000</td>
<td>254</td>
</tr>
</tbody>
</table>

Note(s): **Correlation is significant at the 0.01 level (two-tailed)
The following is the formula for predicting satisfaction through training and infrastructure.

\[
\text{Satisfaction} = 1.39 + \text{training} \times 0.45 + \text{infrastructure} \times 0.15
\]

5.2 Results for RQ#3

The final question intended in this research was research question #3, which is repeated as follows.

**RQ3.** What is the predictability of study level, GPA and prior enrolment in BL courses on student satisfaction?

To answer this question, the averages and standard deviations of the degree of satisfaction with blended learning for students of the Faculty of Foreign Languages were analysed with respect to the three variables (study level, GPA, prior enrolment).

Table 5 shows that there are clear differences concerning the degree of satisfaction of blended learning for students of the Faculty of Foreign Languages with respect to study level, prior enrolment in blended learning and academic achievement (GPA). To determine the significance of these differences, a three-dimensional variance analysis of the degree of satisfaction with blended learning was conducted. The following table shows these results.

Table 6 shows that the value of “F” of the degree of satisfaction with blended learning according to prior enrolment in blended learning was (1.256). “F” of the degree of satisfaction with blended learning on a budget.
with the blended learning according to GPA was (2.588), which is not statistically significant. This indicates that there are no differences in the degree of satisfaction with blended learning due to prior enrolment in blended learning or GPA.

The table also shows that the value of “F” of the degree of satisfaction with blended learning according to study level was (4.418), which is a statistical function. This indicates that there exist differences in the degree of satisfaction with blended learning due to the level of study. In order to determine the main source of this correlation (of study level and satisfaction), an LSD for dimensional comparisons was used. The following table shows these results.

Table 7 suggests that there are statistically significant differences in the degree of satisfaction with blended learning for students of the Faculty of Foreign Languages with respect to the level of study. The differences between first- and second-year students were in favour of second-year students. The differences between first- and third-year students were in favour of third-year students. The differences between first- and fourth-year students were in favour of fourth-year students.

6. Discussion

The first research question aimed at finding which was more important for an institution to invest during the initial phase of blended learning adoption and in cases where low-budget solutions are required. In particular, we asked about the difference between IT infrastructure quality and the training of faculty for blended learning in terms of which had a greater effect on student satisfaction. The indicators of quality blended learning implementation include increased learning outcomes success, retention rates, overall achievement and student satisfaction, to name a few (Garisson and Kanuka, 2004). This research takes one such indicator into consideration, namely student satisfaction. The idea behind satisfaction is that since the end user of institutional adoption of blended learning is in first place, the students, the institutional adoption of blended learning can be said to be a “success” if, among other indicators (see, e.g. Garisson and Kanuka, 2004), students were satisfied with its implementation. Therefore, student satisfaction is taken as one indicator of successful implementation, which in turn, can help determine which is more important in blended learning adoption on a budget; IT infrastructure or blended learning training of faculty.

Table 6.
A three-dimensional variance analysis of the degree of satisfaction with blended learning with respect to study level, prior enrolment in blended learning and academic achievement (GPA)

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III sum of squares</th>
<th>Df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study level</td>
<td>13.255</td>
<td>3</td>
<td>4.418</td>
<td>7.710</td>
<td>0.000*</td>
</tr>
<tr>
<td>Enrolment in BL</td>
<td>0.720</td>
<td>1</td>
<td>0.720</td>
<td>1.256</td>
<td>0.264</td>
</tr>
<tr>
<td>GPA</td>
<td>1.483</td>
<td>1</td>
<td>1.483</td>
<td>2.588</td>
<td>0.109</td>
</tr>
<tr>
<td>Error</td>
<td>142.119</td>
<td>248</td>
<td>0.573</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>157.464</td>
<td>253</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note(s): * Statistically significant at level 0.05

Table 7.
LSD for dimensional comparisons for satisfaction with the blended learning according to study level

<table>
<thead>
<tr>
<th>(I) study level</th>
<th>(J) Study level</th>
<th>Mean difference (I–J)</th>
<th>Std. Error</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>First year</td>
<td>Second year</td>
<td>−0.5772*</td>
<td>0.17320</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Third year</td>
<td>−0.4628*</td>
<td>0.12900</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Fourth year or more</td>
<td>−0.5119*</td>
<td>0.11969</td>
<td>0.000</td>
</tr>
<tr>
<td>Second year</td>
<td>Third year</td>
<td>0.1144</td>
<td>0.17528</td>
<td>0.515</td>
</tr>
<tr>
<td></td>
<td>Fourth year or more</td>
<td>0.0653</td>
<td>0.16855</td>
<td>0.699</td>
</tr>
<tr>
<td>Third year</td>
<td>Fourth year or more</td>
<td>−0.0491</td>
<td>0.12268</td>
<td>0.690</td>
</tr>
</tbody>
</table>

Note(s): *The mean difference is significant at the 0.05 level
seen in the previous section, there was a positive correlation between IT infrastructure and student satisfaction with blended learning, as well as a positive correlation between training of faculty and student satisfaction with blended learning. Hence, both quality of IT infrastructure and the existence of well-trained faculty with respect to blended learning play a role in determining student satisfaction first and the success of blended learning implementation second.

These results are similar to those found in the literature (Sun et al., 2008; Graham, 2006, 2013; Alebaikan and Troudi, 2010; Gedik et al., 2013; Lotrecchiano et al., 2013; Chen and Yao, 2016). This research has discussed the six dimensions affecting student satisfaction, as mentioned in Sun et al. (2008). Therefore, the previous result is in line with the research. What this research adds to the literature on this matter is a preliminary result as to which is more critical to student satisfaction at the initial stage of implementation of blended learning. Regarding predictability of satisfaction, the results showed that training of faculty accounted for 28% of satisfaction while IT infrastructure accounted for only 3%. Though both were found to affect student satisfaction, the degree of effect is different; namely training of faculty had a much higher impact and was a stronger predictor of student satisfaction.

The final research question put forth the idea that a student’s study level (i.e. which year of study the student is in), his/her academic achievement (GPA) and his/her previous experience with blended learning may affect the results in one way or the other. With a three-dimensional variance analysis, the results showed that the higher the study level, the higher the degree of satisfaction at a statistically significant rate. The literature discusses possible reasons behind this result. The possible reason behind such a difference could be attributed to maturity and sense of responsibility (Eom, 2006). As mentioned earlier, the blended learning method adopted at UJ is more student-centred than traditional learning, meaning that students are given more responsibilities to take charge of their own research and learning. This could, nonetheless, pose some difficulty for students of a younger age, as most schools in Jordan still rely on the teacher-centred method. Therefore, the further away they are from pre-university experiences, and the more mature and responsible they become, the more they will be satisfied with blended learning, although independent research will be needed to confirm this.

Moreover, the results showed that student GPA differences did not indicate higher/lower satisfaction with blended learning. This aspect rules out the speculation that low achieving students would dislike the higher workload of blended learning and would consequently rate satisfaction with blended learning lower. Furthermore, the results showed that whether the student had previously taken a blended learning course or not had no significance on their overall satisfaction with blended learning. This may be an indicator that prior enrolment or experience with blended learning courses has no significant effect on student satisfaction with blended learning implementation, though independent research will be required to confirm this result.

A portion of the results found in this study, specifically those pertaining to higher student satisfaction with blended learning if IT infrastructure is sound, is in line with previous research (see, e.g. MacKeogh, 2008; Tshabalala, 2014; Ali, 2018; Uppal et al., 2018; Peltier, 2007; Ssekakubo, 2011). However, this research brings forth new factors that influence student satisfaction of blended learning in a positive way: faculty training and study level. It also brings forth the results that prior experience with blended learning and students’ overall academic achievement levels have no significant impact on their satisfaction with blended learning.

In light of these results, and particularly where faculty training was found to account for the majority of the source of satisfaction rates, it is advised that universities in developing countries with a low budget should focus more on training faculty for correct implementation of blended learning and relevant pedagogies, specifically training on how to become “a guide on the side”, not “a sage on the stage”. Training should focus on shifting instructors’ teaching
mentality from one that is teacher-led to one that is student-centred. What little IT infrastructure a low-budget university has may be enough in this case for the initial phase of blended learning implementation. Moreover, in light of the results pertaining to study level, universities should prioritise implementing blended learning on higher-level students first, that is, start with seniors and then work down to juniors and freshman.

7. Limitations of the study
It is important to cover a few limitations of this study so as to address them in any future study. The first is related to the sample. In particular, only one faculty was chosen, namely the Faculty of Foreign Languages. The choice of this particular school was due to the fact that it was the first school in the university to adopt blended learning and, therefore, has the largest number of faculty and students who have been part of a blended learning course. This has, however, limited the sample size and has limited its variety, as well (i.e. students in scientific majors may have more unfavourable results towards any lack of infrastructure, whereas high-tech infrastructure may not be as important for languages majors). Future research wishing to replicate this study may benefit from varying the sample pool and increasing the number of participants. The second limitation is that this study focusses on student satisfaction, not on faculty satisfaction. The idea behind this focus is that focussing on the “end-user” or receiver of a particular service (blended learning) may better help to understand the quality of its implementation. However, this does leave room for studies that wish to focus on the perceptions of the faculty members themselves; perhaps with regard to how useful they perceive training to be to their implementation and understanding of blended learning. The third limitation is due to the fact that the chosen setting did not completely lack IT infrastructure, and therefore, the results may need to be retested with at least two individual institutions, one where advanced IT infrastructure is available and one where it is completely lacking. The final limitation has to do with success measures. In particular, future studies may wish to replicate this study in a different manner, by taking other factors to be determinant of the success of implementation of blended learning. In other words, this research took student satisfaction to be translated into success or failure of implementation of blended learning, as students are taken to be the end users of blended learning. Others may wish to take more detailed factors as indicative of success, such as levels of academic achievement and completion of intended learning outcomes.

References


**About the authors**

Nimer Abusalim was the first to apply blended learning at the University of Jordan during the Spring semester of 2017 and has been training other faculty members in blended learning implementation ever since. He is now the Director of the Blended Learning Division at the University of Jordan, overseeing quality control and training of blended learning implementation on the institutional level. Academically, he is an Assistant Professor of Linguistics in the Department of English Language and Literature at the University of Jordan. Nimer Abusalim is the corresponding author and can be contacted at: n.abusalim@ju.edu.jo

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