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Innovative assignment rubrics for ODL courses: design, implementation and impact

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Abstract

Purpose – The purpose of this paper is to propose a new standard of assignment rubrics to minimize various interpretations and confusing expectations of the assignment outcome among all stakeholders and enhance the assignment rubrics to function not only as a grading tool but also as an assignment guiding tool for self-managed learning among open and distance learning (ODL) learners.

Design/methodology/approach – The paper looks into the problems and issues related to assignment rubrics such as various interpretation, confusing expectations and the need to have appropriate descriptions in the rubrics in order to reflect proper learning outcome among the assignment stakeholders. To solve these issues, the paper explores the new and improved requirements which were imposed to support the new assignment rubrics for courses in the university via a self-guided manual known as Rubrics Formulation Guide.

Findings – Based on the feedback received from university’s lecturers, who also functioned as moderators, it was indicated that the time taken to moderate the assignment rubrics had drastically reduced and in terms of grading, the clarity of the assignment performance expectations among the learners showed improvement, whereby as compared to the previous semester, there was significant drop for the application of remarking of assignments among May 2014 semester learners.

Practical implications – The paper includes implications of developing innovative rubrics that enhance common understanding and consistent expectation of what the final outcome of the assignment should be.

Originality/value – This paper fulfills the purpose of expanding the potential of assignment rubrics which is to guide and grade.

Keywords Assessment, Assignment rubrics, Self-managed learning

Paper type Case study

1. Introduction

Assessment is the process of measuring and evaluating a learner’s academic achievement for a particular course through continuous assessments and examination (Brown and Knight, 1994). Assessment has always been an integral part of the learning process regardless whether it is traditional and conventional learning or open and distance learning (ODL). Most of the ODL institutions have a combination of formative evaluation via written assignments and summative evaluation via term-end examination (Chaudhary and Dey, 2013). Formative assessment or evaluation in the form of written assignments or essay represents a very flexible test format for assessing ODL learners and enables the stakeholders to monitor whether outcome-oriented or outcome-based learning took place (Chaudhary and Dey, 2013; Oosterhof et al., 2008). Four main features of formative assessment that facilitates these are embedment of assessment activities within teaching and learning processes; diversity of ongoing and authentic assessment conduct; ongoing formative feedback; and clarity of expected outcomes through the assessment rubrics (Gikandi et al., 2011). By simple definition, assessment rubrics comprise a set of criteria and...
weightings used for grading (Ali and Fadzil, 2013). A common definition of rubrics would be a document that articulates the expectations for an assignment by listing the criteria or what counts and describing levels of quality from excellent to poor (Reddy and Andrade, 2010). There are two general methods for rubrics design, which are holistic scoring rubrics and analytic scoring rubrics. Nitko and Brookhart (2011) indicated that holistic scoring rubrics “rate or score the product or process as a whole without scoring parts or components separately,” whereas analytic scoring rubrics “rate or score separate parts or characteristics of the product or process first, and then sum up these part scores to obtain a total score.” Much has been written on the needs of rubrics for ODL assignment, and research has indicated that the highest percentage of students strongly agreed that clear guidelines for course assignments and rubrics are important in contributing to their learning satisfaction (Lee, 2014). Other than saving time taken for grading and providing meaningful feedback, rubrics if used properly, can promote better learning discussion experiences and encourage learners to fulfill two main attributes of ODL, which are to become self-motivated and independent learners (Stevens and Levi, 2013).

2. Problem
The reasons rubrics were introduced in Open University Malaysia’s (OUM) course assignments were to guide learners on how to do their assignments and make grading simpler and structured for graders or examiners (Ali and Fadzil, 2013). Hence from May 2010 semester, all the subject-matter experts were given instruction and guide to develop assignment questions accompanied with rubrics. As an ODL institution, OUM only hires limited number of full-time academics, as such 80 percent of these subject-matter experts consist of external academics from other higher learning institutions that mostly have traditional classroom setting. Although the intention to use rubrics was noble, OUM moderators had to spend time “fixing” the rubrics received from the external subject-matter experts for some of the courses, as the rubrics developed by them were open to various interpretations and confusing expectations of the assignment outcome. Most of the external subject-matter experts developed the rubrics based on traditional classroom setting; however, simply transferring assignment rubrics from the traditional classroom to the ODL environment is not always the best decision (Hemby et al., 2006). Jonsson (2014) reviewed that “rubrics can facilitate improvements if combined with other meta-cognitive learning activities” and went further to add on “but there is limited evidence supporting the claim that the use of rubrics by itself for self-learning leads to improvements in performance.” Rubrics will normally contain criteria with descriptions directed at learners; however, rubrics can also contain descriptions directed at other stakeholders such as graders “for guidance and comment banks associated with the criteria” (Heinrich et al., 2012). Rubrics can both teach and evaluate, but many rubrics received from the subject-matter experts only emphasized on evaluation whereby it indicates in which level the learners fall into, but did not show or teach learners how to achieve the highest level of performance (Hemby et al., 2006; Reddy and Andrade, 2010).

3. Objective
The objectives of this paper are to:
- propose a new standard of assignment rubrics to minimize various interpretations and confusing expectations of the assignment outcome among all stakeholders;
- enhance the assignment rubrics to function not only as a grading tool but also as an assignment guiding tool for self-managed learning among ODL learners; and
- implement the above innovations on the assignment rubrics.
4. Justification for innovation

Assignment rubrics come in various forms with some having complex descriptions of what learners need to achieve, whereas some with simple and specific descriptions (Stevens and Levi, 2013). In traditional learning setting, the lecturers and tutors, who are the subject-matter experts who had crafted the rubrics and will eventually mark the assignments, have the opportunity to physically explain and deliberate on these descriptions in the classroom so that the learners have an understanding of what is expected from them (Hemby et al., 2006). However in ODL setting, the learners do not have the same privilege as they have limited classroom or totally rely on online learning, whereby the discussion on assignment expectation and rubrics might be limited or might not be as comprehensive and interactive as in classroom setting. Another challenge is that assignment rubrics goes through various processes in ODL setting from development, moderation, teaching, learning and grading by various and different stakeholders, which exposes various interpretations (Chaudhary and Dey, 2013). Thus the ultimate aim of this paper is to create assignment rubrics that are suitable for ODL courses which enhances common understanding of the assignment outcome. In order to support this “common understanding” functionality, the rubrics has to be focused on not only grading but also on guiding, which can be done by innovatively enhancing the criteria of the rubrics as well as standardizing the level of performance descriptions of the rubrics. These innovative assignment rubrics can be useful for various ODL institutions in supporting their learners for formative assessment especially in assignment writing.

5. Design

5.1 Rubrics in OUM

OUM has been using assignment as a component of continuous assessment since its establishment. As a move to improve assignment submission and grading, OUM has incorporated the usage of assignment rubrics in the assignment questions starting May 2010 semester (Ali and Fadzil, 2013). The move is also in conjunction with the implementation of online Assignment Submission System and Assignment Grading System. The Assignment Submission System enables learners to view or download their assignment questions together with the rubrics from OUM’s online learning management platform. The learners will submit the soft copy of their completed assignment via this system, whereas the Assignment Grading System allows appointed graders to view learner’s assignments and mark them according to the embedded rubrics in the system. The general rubrics structure used by OUM is as per shown in Figure 1.

Prior to publishing the assignment questions and rubrics online, a few processes take place each semester. First, the assignment questions and rubrics are developed by the appointed subject-matter experts a few months earlier before the start of the semester. Then the assignment questions and rubrics go through the moderation process done by OUM’s internal academics or lecturers. It is during this process that the assignment questions and rubrics are edited, corrected and modified if necessary to be error free and elicit clear understanding of the expectations. Once moderated, the assignment questions and rubrics are published via OUM’s online learning management platform to be used by face-to-face (classroom) tutors, online tutors and learners for teaching and learning. Finally OUM’s appointed graders will mark the assignments submitted by the learners. Figure 2 depicts the various stakeholders in various processes or stages involving assignments in OUM.

Although the subject-matter experts were given Assignment Kits which contain guidelines on how to develop the rubrics, the rubrics that some of them had developed can be considered imperfect, as the rubrics were either too simple or missing crucial details. Such rubrics may have been allowed to be published and distributed in traditional learning setting as the subject-matter experts who will in turn be the classroom lecturers or tutors have the luxury to explain the intended meaning and expectations of the rubrics clearly to their learners.
However, as mentioned earlier, such situations may not happen in ODL setting whereby the face-to-face tutors and online tutors who comprise of many and different individuals teach various number of learners spread around the region. With such imperfect rubrics, the graders are at lost on how to mark the learners’ assignments, as the descriptions in the rubrics do not reflect learners’ work. Thus the moderators play an important role to modify the assignment rubrics appropriately in order to minimize various interpretations and confusing expectations among various stakeholders. This modification process takes a lot of time and the main issues during moderation are discussed as per the following.

### 5.2 Issues

#### 5.2.1 Number of points needed

Some subject-matter experts had developed assignment rubrics’ Levels of Performance (LoP) which indicates that learners need to provide a certain number of points and elaborate or explain those points as given in Figure 3.
The description of number of points given in the LoP columns confuses the graders. The description of performance of Level 1, 2 and 3 is shown below:

- Level 1: provides two Competitive Forces (CF) models with poor explanation.
- Level 2: provides three CF models with fair explanation.
- Level 3: provides four CF models with good explanation.

The graders were undecided or have difficulty to grade if the learners provided four CF models but only two of their CF models had good explanation. The learners may not fulfill Level 3 requirement fully, but their effort is also not reflective of Level 1 and 2, thus the graders were unable to tick a suitable level for the learners.

5.2.2 A lot of descriptions in the LoP columns. Some of the assignment rubrics’ LoP developed by the subject-matter experts had a lot of description of performance that the learners need to meet for a particular criteria, as shown in Figure 4.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight -age</th>
<th>Weak</th>
<th>Low</th>
<th>Fair</th>
<th>Above average</th>
<th>Excellent</th>
<th>Max Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company ABC strategies using Competitive Forces (CF) Models</td>
<td>--</td>
<td>No explanation</td>
<td>Provides 2 CF models with poor explanation</td>
<td>Provides 3 CF models with fair explanation</td>
<td>Provides 4 CF models with good explanation</td>
<td>Provides 5 CF models with excellent explanation</td>
<td>..</td>
</tr>
</tbody>
</table>

Where do the graders tick or grade if learners provided 4 CF models but only 2 CF models had good explanation?

![Table Example](image1.png)

![Table Example](image2.png)

Where do the graders tick or grade if learners only met 2 of the description in the LoP? Where else, the other LoPs are NOT suitable to reflect the learner's work!

![Figure 3](image3.png)

Figure 3.
Number of points needed to be elaborated

![Figure 4](image4.png)

Figure 4.
More than one description of performance in LoP columns
Such description of performance has also posed problems to the graders, whereby as per example given in Figure 4, for Level 3:

- Description 1: two types of data storage are stated.
- Description 2: only one type of the data storage is described.
- Description 3: example of the data storage is given.

Thus if the learners meet all the three descriptions of the performance, then only the learners fulfill Level 3 of the criteria. Problem arises if the learners only met two of the description and did not manage to meet the third criterion. In this case, the graders were also unable to tick a suitable level for the learners, as the other LoPs do not match the learners’ efforts.

5.2.3 Simple criteria and LoP. Most subject-matter experts developed the assignment rubrics with criteria that only had simple description of what is required from the learners for the particular section. Thus the descriptions on how to perform or write the essay section effectively were supposed to be indicated at the LoP columns. However, most subject-matter experts also developed the LoPs with simple description of performance. This turns the assignment rubrics into a very weak or simple guide for writing the assignment without thoroughly informing the learners on what they need to demonstrate in each section. Some subject-matter experts too, write the description of performance for each LoP (other than Level 4 or Excellent Level) in a manner of guessing how the learners would not score the particular criteria of the section. Thus moderators had to fix each of the LoP to reflect the degree of which the learners were able to demonstrate the learning outcomes for the particular section. Looking into this scenario, it was decided that the moderators are spending too much time on fixing the LoP columns which were previously suggesting to the learners on how not to score excellent level marks (other than Level 4 or Excellent Level) and the learners too, spending too much time relating how best they can score the particular criteria by analyzing the Level 4 or Excellent Level of the LoP as shown in Figure 5.

5.3 New design of assignment rubrics

5.3.1 New approaches taken. After going through the issues such as various interpretation, confusing expectations and the need to have appropriate criteria and LoPs to reflect proper...
learning outcome among the assignment stakeholders, it was decided that a new standard of assignment rubrics has to be developed. The decision came after several meetings among OUM moderators (internal lecturers) on the issues faced by them with assignment rubrics and measures to improve them. Starting May 2014 semester, these requirements were imposed to support the new assignment rubrics for non-programming information technology (IT) courses at OUM:

- all assignments should only use analytic scoring rubric as it is more suitable for non-programming IT courses as it allows evaluation of specific dimension and elements of learners’ response for each criteria (Kane et al., 1997; Nitko and Brookhart 2011);
- description of the criteria in the assignment rubrics has to be strengthened and should be detailed enough in order to guide the learners to complete the assignment (Wolf et al., 2008); and
- since the criteria will be detailed enough, the words in the LoP columns will be standardized and customized to only indicate how near or far the learner’s are from achieving the requirements of the rubrics according to the criteria.

5.3.2 Analytic scoring rubric. Previously most of the subject-matter experts developed analytic kind of scoring rubrics for the non-programming IT courses’ assignments; however, there were a few holistic scoring rubrics too, submitted by them. Starting May 2014 semester, all subject-matter experts were requested to submit their assignment questions accompanied with analytic scoring rubrics only. Based on past researches, analytic scoring rubrics would be more suitable for the non-programming IT courses’ assignments as this type of rubrics provides some objectivity to the evaluation of learner’s performance on specific sections and learning outcomes, helps in clarify and avoids confusing assignments and is suitable to provide a common ground for tutors and learners in understanding the assignments (Nitko and Brookhart, 2011; Gikandi et al., 2011; Stevens and Levi, 2013). Analytic scoring rubrics are also considered most suitable to support the next initiative which is strengthening of the criteria description.

5.3.3 Strengthening of the criteria description. One of the most significant changes to the rubrics was the strengthening of the criteria description in which the criteria will have explicit and clear descriptions of what is expected for the particular section of the assignment rather than simple descriptions (Kearns, 2012). In order to do this, the criteria section will contain detailed descriptions (like a checklist) of what learners are supposed to do for this section of the assignment (teach) and what they need to fulfill (taken from Level 4 or Excellent Level). In other words, the criteria description will be enhanced and will also have a merger of description taken from the Excellent Level as shown in Figure 6.

The new criteria will look like Figure 7. All the requirements have to be clearly stated in the criteria column, thus learners do not need to read any other columns in terms of guidance. The other columns (Low-Excellent) will have standardized descriptions and are only to show where the learners’ marks fall. With these changes, the moderators are no longer expected to spend time moderating Low to Excellent Level columns extensively, instead they just have to spend time on the criteria column during moderation and do the changes or corrections if necessary.

5.3.4 Standardization of LoP columns. One of the problems faced with the previous semester rubrics was that the LoPs submitted by some of the subject-matter experts did not have consistent leveling between each level or did not show appropriate incremental improvement between LoPs, as the subject-matter experts were too focused on what could have the learners done wrong for the particular section of their assignment in the LoPs (other than the Excellent Level). Other than this, the previous assignment rubrics’ LoPs had descriptions that indicate certain number of points or a lot of description of performance...
The new rubrics will have a merger of the descriptions from the Excellent Level to the Criteria column.

### Previous Rubrics

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight-age</th>
<th>Weak</th>
<th>Low</th>
<th>Fair</th>
<th>Above average</th>
<th>Excellent</th>
<th>Max Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Company ABC using Competitive Forces (CF) Models

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight-age</th>
<th>Weak</th>
<th>Low</th>
<th>Fair</th>
<th>Above average</th>
<th>Excellent</th>
<th>Max Marks</th>
</tr>
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<td></td>
<td></td>
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</tbody>
</table>

### New Rubrics

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight-age</th>
<th>Weak</th>
<th>Low</th>
<th>Fair</th>
<th>Above average</th>
<th>Excellent</th>
<th>Max Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Discussion of 5 Competitive Forces (CF) Models in Company ABC by touching on the following details:
- Strategies used for each model
- Relevant examples for each model

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight-age</th>
<th>Weak</th>
<th>Low</th>
<th>Fair</th>
<th>Above average</th>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The new rubrics will have a merger of the descriptions from the Excellent Level to the Criteria column.

### Figure 6.
Merger of descriptions from excellent level column to criteria column

### Figure 7.
Example of new criteria with detailed description
that the learners need to meet, which posed difficulties for the graders to mark learners’ assignments (if the learners only partially meet the LoPs). Thus the new strategy was to standardize the descriptions in the LoPs, which now can be easily done since the criteria section is explicit enough, as shown in Figure 7. To avoid confusion and overlapping between the description in the criteria and LoP columns during new assignment rubrics development, subject-matter experts were informed that the descriptions in the criteria section are specific pointers of what is required, whereas the words in the LoP columns are more of scales (poorly, minimally, good, in-depth, etc.). The descriptions in the criteria section can use words such as suitable, appropriate, relevant, etc. but should avoid using the words that represent scales such as great, intricate, deep, good, excellent and others.

As shown in Figure 8, by having standard descriptions in the LoP columns, the previous problem of the grader being undecided on which marks or rubrics to tick for learners who only partially fulfills a certain LoP, no longer arises.

As per the description of the criteria section in Figure 8, learners have to discuss about five CF Models in Company ABC by elaborating the strategies used and relevant example for each model. Since the new LoP columns do not have the words such as “Provides 4 CF models with good explanation” or “Provides 5 CF models with excellent explanation” as shown in Figure 3 previously, the grader is no longer bounded to mark or tick on the LoP Column that does not represent the learners’ effort for the particular assignment section. If a learner provided five CF models but the elaboration was not long enough, then the marks could fall in Above average column. However, there were concerns that the standard descriptions in the LoP columns do not provide adequate formative feedback to the learners in relation to their writing performance for the particular assignment section, but this would not be an issue in OUM as the Assignment Grading System allows the graders to provide specific feedback in the overall comments section as shown in Figure 9.

### 6. Implementation

The new standard of assignment rubrics was suggested based on several meetings that OUM moderators (internal lecturers) had, to discuss their experiences and challenges endured in fixing the previous rubrics submitted by the subject-matter experts. In the IT cluster,

**New Rubrics**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Weight-age</th>
<th>Weak</th>
<th>Low</th>
<th>Fair</th>
<th>Above average</th>
<th>Excellent</th>
<th>Max Marks</th>
</tr>
</thead>
</table>
| Discussion of 5 Competitive Forces (CF) Models in Company ABC by touching on the following details:  
- Strategies used for each model  
- Relevant examples for each model | .. | No answer or wrong answer was given | Provided vague answer or answer that poorly met the details of the criteria | Provided limited answer or answer that basically/ minimally met the details of the criteria | Provided good answer that mostly met the details of the criteria but it can be improved further | Provided in depth answer that clearly met the details of the criteria | .. |

If a learner provided 5 CF models but the elaboration was not long enough, then the marks could fall in Above Average Column

---

**Figure 8.** Standard descriptions in the LoPs
there are two types of courses, which are programming (inclusive of mathematics) and non-programming courses. The programming courses’ assignments such as C and Java have structured and specific answers, thus the previous rubrics did not pose any problem of misinterpretations. However, for non-programming courses’ assignments, which have a mixture of restricted and extended responses sections in the assignment, the new standard of assignment rubrics was very much needed.

In order to improve the understanding and clarity of the rubrics, it was decided that improvement efforts should start from the beginning, which is during the assignment question and rubrics development by the subject-matter experts. As such a new guideline for rubrics was introduced in May 2014 semester and included in the Assignment Kits. Using the same concept of modules or textbooks created by OUM for its ODL learners, which supports self-managed and self-regulated learning, the new guideline for rubrics for subject-matter experts was developed in the form of a self-guided manual to train them on how to prepare “good rubrics” suitable for ODL learners as well as to understand why such rubrics are important and how are the rubrics different from other conventional rubrics. The self-guided manual is aptly named as Rubrics Formulation Guide (RFG), which the subject-matter experts can read on their own pace before working on creating the assignment question and rubrics.

The RFG was created, not only to train the subject-matter experts on what kind of rubrics to produce but also why such rubrics is needed for ODL learners as well incorporating answers for questions that might be predictably popping up in the subject-matter experts’ minds when they read the guideline. The contents of the guideline were decided after a few brainstorming sessions among the OUM moderators, and the predictive questions were also discussed in such sessions. The RFG content are divided into: How to develop the new rubrics criteria and LoP columns, Assigning of appropriate weightage and maximum marks for the rubrics, Frequently asked questions (FAQs), Examples of assignment questions with rubrics and Rubrics templates for subject-matter experts for rubrics development. The Rubrics Templates consist of sample descriptions (in English and Bahasa Malaysia) for the criteria and LoP columns for Introduction and Conclusion sections, sections which need illustration and sections which need the learners to provide discussions, recommendations, justifications, etc. The Rubrics Templates
section (only) can be accessed by public at https://drive.google.com/open?id=0B6cnrxakGFneSDEzRXd5by1uMHc.

Past researches had also emphasized that clarity and appropriateness of language are central concerns among the stakeholders of the assignment rubrics (Reddy and Andrade, 2010). As such the RFG had also included the new instructions that requests subject-matter experts to use past tense (example: was, were, provided, discussed, etc.) or past future tense (example: there is still room to improve, etc.), since the rubrics will also function as a grading tool to show how the learners have fared for their assignment work.

7. Impact
The new guideline for rubrics, RFG included in the Assignment Kits and distributed early May 2014 semester, had positive responses from the subject-matter experts. Although the subject-matter experts claim that the time taken to develop the assignment rubrics according to the new requirement took a longer time as compared to previous semester rubrics, they understood and appreciated the improvement done for the rubrics. However, some of the subject-matter experts did raise two main concerns which are: the detailed criteria in the rubrics might function as an answer scheme and expose the answers to the learners and the standardized version of the LoPs might not be a comprehensive feedback needed by the learners. The subject-matter experts were assured that these concerns had been taken into consideration earlier during the development of the RFG. For the first concern about revelation of answer through detailed criteria, in the RFG’s FAQ section, it had been mentioned that the details in the criteria, only function as a guideline or focused scope for the learners to follow or write in which without these details, the learners might have provided inaccurate answers or explanations that are off-target. As for the second concern, that the learners might not get comprehensive feedback as the descriptions in the LoP columns are quite standard and general, the subject-matter experts were briefed that OUM’s Assignment Grading System has an Overall Comment section whereby the graders can provide customized and specific feedback according to the learner’s performance for each assignment section.

After the implementation of the new rubrics for May 2014 semester, the moderators had given encouraging response. Based on the feedback received (during academic meeting) from ten of OUM’s internal lecturers under IT cluster, who also functioned as moderators, it was indicated that the time taken to moderate the assignment rubrics had drastically reduced. On average basis, previously it took about 3 h to moderate each assignment question and rubrics; however, after the implementation of the new rubrics, it only took 1 h on an average for the moderation. This is due to the improved rubrics design whereby the moderators no longer spend much time moderating the LoPs Columns which had standardized description, the focus now is only on the criteria column which needs to be checked whether the description clearly exhibits the learning outcome for the particular section and contains clear details that guide the learners on how to achieve them.

However the ten moderators who also teach at OUM’s Sri Rampai Learning Center claimed that the time taken to discuss about how to write the assignment and explain each section of the assignment rubrics in the classroom and online forum did not significantly change as compared to previous semesters. This was also echoed by two external part-time tutors who teach at Sri Rampai Learning Center, when they were asked during tutor meet-and-greet session, about the impact of the new assignment rubrics. Upon clear deliberations, it was found out that the learners were always eager and spend time during the classroom sessions to get information regarding how to write the assignment and get good score, regardless of the type of assignment question any semester; however, for May 2014 semester, the classroom discussion this time did not involve much time for the tutors to explain or dissolve about any misinterpretations, confusion or lack of details in the rubrics as compared to previous semesters.
In terms of grading, the clarity of the assignment performance expectations among the learners showed improvement. As compared to the previous semester, there were significant drop for the application of remarking of assignments among May 2014 semester learners. Table I shows the total number application for remarking made by learners for the non-programming courses' assignments from January 2014 semester until September 2015 semester.

In January 2014 semester, a semester before the implementation of the new rubrics, there were total of 48 applications submitted by learners who were dissatisfied with their assignment results. However, for the May 2014 semester, the semester in which the new rubrics were implemented, the application for remarking dropped to 35 application, a 27 percent drop from the previous semester and the following September 2014 semester showed a higher drop of 40 percent (21 applications). This shows that the gap between expected performance and actual performance among learners has been reduced as the rubrics criteria have provided a clearer guidance and the LoP columns no longer have simple or confusing descriptions.

8. Conclusion

Formative assessment such as written assignment is an integral part of ODL assessment. In terms of ODL setting, assignment is well positioned to support ODL learners as it allows them to apply their experience and knowledge in the written form. It is of utmost pertinence that assignment by itself must be reliable and consistent in relaying the targeted outcome of learning, so that the ODL learners can gain the most benefit of this assessment. Thus, ODL learners need formative assessment instruments which are more objective in nature and outcome-orientated or outcome-based. Rubrics descend nicely into place in answering or representing such assessment instrument. However, merely providing rubrics will not bring ODL teaching and learning participants anywhere. Rubrics by themselves need to be “rich” in order to guide the learners objectively and independently, while at the same time reflecting representative grade. In other words, rubrics should guide and grade. The innovative rubrics presented here can support both, in addition to improving common understanding, promoting consistent expectation of the learning outcome and minimizing various interpretations across the assignment stakeholders.

As outcome-based assessment is now very popular among ODL institutions, it is aptly suitable to consider widespread of usage of rubrics as a one-stop assessment platform for guiding and grading. Assessment rubrics which have been used to make the teaching-learning process effective and measure the learning outcomes, would be one of the most effective ways to implement outcome-based formative assessment. It is hoped that this paper will give birth for more innovative rubrics that can support ODL assessment in general and outcome-based assessment in specific. In future, the usage of these innovative rubrics can be expanded beyond IT courses, to other field of subjects, in order to support ODL institutions in measuring achievement of course learning outcomes via formative assessment such as assignment writing.

| Table I. Total number of remarking application for non-programming courses |
|-----------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Remarking application | 48            | 35        | 21              | 19            | 16        | 13              |
| Percentage of reduction for remarking application | ↓ 27         | ↓ 40      | ↓ 10            | ↓ 16          | ↓ 18      |                 |
References


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Innovative assignment rubrics for ODL courses
Mediating role of students’ engagement to their classes
An experience from higher education in Pakistan
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Abstract
Purpose – The purpose of this paper is to establish the mediating role of students’ engagement to their classes, for the conventional relationship between teachers’ efforts and students’ development, for a better understanding of the instruction-based classroom learning.
Design/methodology/approach – The investigation is made using a multi-stage-stratified-systematic sample of 500 students from business and engineering schools with an almost equal representation of both the genders and the type of schools’ ownership. A structural equation modeling is used for this mediation analysis.
Findings – The mediating role of students’ engagement is identically established both for business and engineering schools and for both genders. However, in public sector universities, this mediation is insignificant.
Research limitations/implications – The investigation is limited only to business and engineering schools, and this limitation may conceal some factor(s) more important for other schools. Further, the investigation is reading data from Lahore, a metropolitan, which may hide some factor(s) some appropriate for smaller cities.
Originality/value – The data are gathered, analyzed and discussed through the lens of the socio-cultural theory, allowing for a comprehensive understanding to emerge for students’ engagement to their classes.
Keywords Quality of higher education, Social learning theory, Students’ engagement

Introduction
In instruction-based education, the role of teacher is critically exclusive. May it be the vernacular folk literature or the conventional academic discourses, the role of the teacher is always given the highest echelon for the student’s learning and development. The whole education system seems to be revolving around the teachers’ efforts and performance. However, there exist deviations and exceptions, both at observatory and analytical levels for this direct relationship. A teacher performing exceptionally well in one set of circumstances may not be able to reproduce its effectiveness in the other set of circumstances. So much so, a teacher performing well in one section of a class may not be able to perform equally in the other section of the same class while teaching in the same academic year. Without ignoring the students’ ability differentials, these observations indicate some extraneous variable(s) which mediate this conventional relationship between a teacher’s efforts and the student’s learning and development. Let us call this mediating variable as the student’s engagement to their classes which converts the teachers’ efforts into students’ development. The current paper is written for a sole objective that students’ engagement to their classes mediates the relationship between the teachers’ efforts and the students’ performance in the classes.

The concept of students’ engagement to their classes is a newly developed concept (Allen et al., 2018; Barkley, 2018; Kahu and Nelson, 2018) and has been defined in different
ways by different researchers. However, it may either be theorized as a sense of social
relatedness or belongingness (Bear et al., 2018; Hughes and Kwok, 2007), or an experience
(Ellis et al., 2018; Siddiqi, 2018), which is based upon a number of in- and out-class factors.
It is believed, and empirically proved in many different scenarios and socio-economic
settings, that it is the sense of engagement that motivate students to participate actively and
appropriately in their classrooms (Anderman and Anderman, 1999; Birch and Ladd, 1997;
Skinner and Belmont, 1993). Such a motivated participation and appropriateness leads
directly to successful academic and socially better outcomes. This makes one thinks that the
teacher’s efforts are translated into the feelings of engagement among its student, and it is
the level of engagement that is directly related to the level of success of the students.

Theoretical background
Education in its traditional sense is a form of learning in which knowledge, skills and behaviors
of a group of people are transferred from yester generation to the next through teaching,
training, and research. Such a teaching is a twin faced process, as Dewey (1897) puts it;
psychological in basis as it starts with a child’s own instincts and abilities, and social in its
explicit manifestation as it involves, both direct and indirect, explicit and implicit, interaction
between stakeholders. Both of these faces are not supplementary to each other but complement
the success of whole process. Teacher lies at the center of all discussions (Griffin and Brownell,
2018; Levin, 2018); its personality, its motivation, its drive, its behavior, everything is heavily
researched and has significant impact on its performance which ultimately reflects in the
students’ outcome. The psychological construct of its performance discusses internal drive,
motivation and sense of achievement (Alessandri et al., 2018; Carmona-Halty et al., 2018).
While, the social construct is based upon expectation (Kim et al., 2018; Perera et al., 2018;
Rubenstein et al., 2018). Without belittling the prominence of psychological basis of the
education process, this paper is focusing on the social side.

The paper is using three specific domains of theories to understand the education
process, namely, social learning theories which explicates a teachers’ efficacy in terms of its
behavior, pedagogical theories which focus on the process and the substance the students
should be dealt with and student involvement/engagement theories which focus on
the experience generated through the combined action and interaction of both teacher and
the process. The idea discussed here in this paper has its roots in all of these three. However,
it needs to be tested empirically for its establishment.

The social learning theories presents a traditional view of the social aspect of the process.
It is quite straightforward and based upon the interactions and behaviors. Believing the
teacher being the first pillar of the process, it is thought that the teacher’s behavior is
cultivated by his, or her, experiences and the stimuli generated through environment in
contrast to mere drive as claimed by stimulus response theories (see e.g. Hull, 1930). Rotter
(1966, 1970, 1982), in his social learning theory, asserts that the teachers’ likelihood of
engaging in a certain behavior is formed by the perception of the outcome of the behavior
and the probability of that outcome. He calls this perception as reinforcement value of the
behavior and the probability as its expectancy. More, specifically, a teachers’ behavior (B) is
given by a function of this reinforcement and its expectancy, as:

\[ B = f(E, R) \]

where \( E \) is the expectancy, in terms of perceived probability that the desired results would
produce, and \( R \) is the teachers’ reinforcement value of the behavior. The theory is quite
straightforward and attempt to functionalize a teachers’ behavior, which may lead to some
pre-conceived outcomes at students’ side, in terms of its perceived success. More specifically, a teachers’ efficacy is a behavior which is evolved by its perceived outcome in
the class; better the expectation, more is the efficacy. The theory is probably the first which translates the efficacy into the nature of social interactions. The RAND researchers applied this theory to conceive that the extent to which teachers believe that they control the reinforcement of their actions lay within themselves or in the environment (Tschannen-Moran et al., 1998). Besides its simplicity and straightforwardness, the theory faces strong criticism. Expectancies are calculated from past experiences. The more often a behavior has led to reinforcement in the past, the stronger the person’s expectancy that the behavior will achieve that outcome now. Reinforcement value refers to the desirability of these outcomes. As a matter of fact, things one wants to happen, that one is attracted to, have a high reinforcement value. And, things one does not want to happen, that one wishes to avoid, have a low reinforcement value.

Another theory which is used to explain the social side of the education process is enunciated by Bandura (1977, 1989, 2001). It is a logical continuation, and extension, of Rotter’s (1966, 1970, 1982) deliberations. He emphasizes the role of self as a significant and powerful moderator in the translation of social interactions into efficacy. In other words, if the teacher is motivated enough for the outcome, higher would be the efficacy. More specifically, the functional relationship should have a form given by:

\[ B = f(E, R, S), \]

where \( S \) is the factor represents’ self in terms of cognition, belief and personality. Bandura (1977) believes that humans are active information processors and think and then control about the relationship between their behavior and its consequences. Observational learning could not occur unless cognitive processes were at work.

Both of these theories are very relevant for explaining the relationship between a teacher’s efforts and performance and the student’s learning and development. These theories explains the role of behavior in the carving and developing a teachers’ efforts, while the reinforcement to this behavior is developed either due to their personal expectations and/or their self. The functional form, both in Rotter (1966) and Bandura (1977), is not linear or simplistic and depends upon many endogenous and exogenous factors (Goddard et al., 2000). It may be the subject matter, its nature, quantity and quality, classroom ecologies, agronomy which effect the shape of this function.

These factors lead to the second domains of theories that have been considered here. Let us call them pedagogical theories as these related to the pedagogical process of transferring knowledge and skills. These theories consider the education process as a manufacturing process with the learning and development of the students as the tangible, and thus measurable, product and based upon the principle, popular in industrial settings, that better the process better, is the product. These include first, the theories related to the subject matter and the contents that should be adopted in different classes. The concept is simple; right the material, right the output. It requires fixed curriculum, roadmaps and policies every student has to take. Most of the engineering schools, especially in Pakistan, are working on this fixation. Albertyn et al. (2008), Gibbs and Simpson (2005), Keith and Cool (1992), Marsh and Yeung (1997), Pike (1991), Simonite (2003) are few names who work for the advocacy of this theory. Second are the theories related to the campus environment and facilities available to students. The main concept here is better the environment and facilities available to students, better are the students in their achievements and development. Allen (1992), Ancis et al. (2000), Belch et al. (2001), Bradshaw et al. (2018), Davis (1994), Hurtado (1992), Kahu and Nelson (2018), Kuh (2009), Thomas and Galambos (2004), Zhou (2017) are a few names who believe that campus resources and the environment is an important determinant in the success of the education process. Most of the accreditation bodies, like Higher Education Commission, Pakistan Engineering Council in Pakistan, European Quality Standards, etc., believe in this
resource theory, Third are the theories related to the individuality of a student. The concept is: need of every student is unique and has to be dealt specific to these needs. It goes beyond the curriculum and resource related boundaries and address directly the student with respect to its individual specialized needs.

As a matter of fact, both of these types of theories are one in nature as both are stimuli attempts to transform the students. The third theory which plays significant part is the theory of engagement. The theory of engagement is concerned with inter-relations of time, teachers’ enforcement, ecologies and other relevant resources invested by students, teachers and the universities intended to maximize the students’ experience (Siddiqi, 2018). The literature is replete with numerous works establishing its importance in different dimensions. It is an experience which has its roots in the classrooms and is based however on many other, both endogenous and exogenous, dimensions. The literature on the topic seems to be split between schools of thought which are either based upon the constructivist theory (Ginsburg and Opper, 1988; Wadsworth, 1996) and involve factors endogenous to the classroom itself, or the socio-cultural theory (Hickey and Granade, 2004; Lantolf, 2000; Vygotskii, 2012) which involves factors mostly exogenous in nature. The assessment of the experience is typically at the classroom level and involves global assessments across all activities. Many definitions and measures focus on the teacher, and the factors endogenous to the classroom for developing this engagement. Like Blatchford et al. (2011) explore the role of class size, Diemer et al. (2013) explore the role of technology (iPods); Jensen (2013) investigates the role of poverty; Vitiello et al. (2012) investigate the effect of class time and timing; Shernoff et al. (2017) investigate the role of seating position (Castro et al., 2017); Valiente et al. (2012) explain the impact of students’ psychology; Oga-Baldwin and Nakata (2017) explore the role of motivation, on the part of teacher; Buhs et al. (2010) explore the connection between in-class peer-to-peer victimization and social, or physical, exclusion; Bingham and Okagaki (2012) study the impact of ethnicity, etc., just to name a few variables researchers have investigated and explored their roles for developing classroom engagements.

These three domains of theories develop an interesting troika to understand the education process where the social learning theories emphasize the role of teacher (in terms of his/her behavior) for the development of students; the pedagogical theories emphasize the role of the process of imparting education for this development in students while the engagement theory accentuates the experience at the class, and/or in the campus, which actually transforms the students.

Hypothesis to be tested
Believing the dynamics of school and university education are different, the scope of the current paper is limited to university education only. Further, it is limited to the students of business and engineering schools primarily to cater the students of privately owned universities which impart education to these two types of students. The hypothesis to be tested in the paper is given by:

\[ H1. \text{ Students’ engagement to their classes is a mediator for the relationship between teachers’ efforts and students’ development.} \]

Methodology
With presumably teachers’ efforts and pedagogical process at one end, students’ development and learning at the other, while the students’ engagement is meddling in between, acting as a mediator for the traditional relationship between the formal two. This presumption seems quite logical; however, it needs formal testing for its assertion. The paper is an attempt toward the same direction.
The questionnaire

The study is based upon three different, however, duly tested questionnaires to cater its different needs:

1. The questions measuring the students’ engagement to their classes is based upon a study conducted to explore students’ engagement for a measuring construct for the same by Siddiqi (2018). The data are taken from different students of business and engineering students. The result is six factors’ construct for students’ engagement to the classes, with items seeking information on university atmosphere, different facilities available in university, rigor of the course work, social diversity of the class, teachers’ professional competence, and class conduction rules and policies, being the important factors in descending order of importance. Cronbach’s (1951) $\alpha$ value is reported to be 0.817. These factors are estimated by 59 different variables focusing on different socio-psycho-educational characteristics of the classes and the schools.

2. Ramsden (2003) enlists 13 characteristics of good teaching, namely, a desire to share your love of the subject with students, $T_1$; an ability to make the material being taught stimulating and interesting, $T_2$; a facility for engaging with students at their level of understanding, $T_3$; a capacity to explain the material plainly, $T_4$; a commitment to making it absolutely clear what has to be understood at what level and why, $T_5$; showing concern and respect for students, $T_6$; a commitment to encouraging independence, $T_7$; an ability to improvise and adapt to new demands, $T_8$; using teaching methods and academic tasks that require students to learn actively, responsibly and co-operatively, $T_9$; using valid assessment methods, $T_{10}$; a focus on key concepts, and students misunderstandings of them, rather than covering the ground, $T_{11}$; giving the highest quality feedback on student work, $T_{12}$; ans a desire to learn from students and other sources about the effects of teaching and how it can be improved, $T_{13}$. These characteristics have been taken as items for seeking information on teaching quality. The construct is been widely used to assess the teaching quality and its Cronbach (1951) value is reported to be more than 0.70 (Byrne and Flood, 2003; Chan, 2003; Duff, 2003; Prokop et al., 2007; Richardson et al., 2012; Stes et al., 2008).

3. Students’ output is measured in terms of their academic and social attainments (Allen, 1992; Jacobsen and Forste, 2011; Richardson et al., 2012). The social attainments are measured through questions taken from the well-reputed and well-published Emotionality–Activity–Sociability–Impulsivity scale (Rowe and Plomin, 1977).

A pilot survey was being conducted to establish the reliability of the questionnaire. The overall reliability, as calculated by using Cronbach’s (1951) $\alpha$, is 0.775 which is sufficient enough to call the instrument reliable for the current investigation.

The participants

The sample size estimation is based upon Guadagnoli and Velicer (1988) and Hair et al. (2007), where the data are gathered from 500 (52 percent male, 48 percent female) university-level students attending business and engineering schools (50 percent business and 50 percent engineering students) of universities working each in public and private sectors (54 percent private and 46 percent public sector’s students) with a mean age of 23 (SD = 3.2) years. The only reason for selecting the students from these two schools is to consider both science and social-science students.
The research design
The data are collected using multi-stage stratified systematic sampling. The sector of operation, being public or private, and the type of school, being business or engineering, are the respective stratifications at the two stages of the sampling. Probability proportional allocation scheme is used to extract participants from the universities in Lahore, Pakistan, which offer both business and engineering programs (6 out of 13 in public, 15 out of 24 in private sector); 40 students (21 males, 19 females) are selected from each selected public sector university, while 18 students (10 males, 8 females) are selected from each private sector university. Students are contacted, for questionnaire filling, just after their classes to confirm their identity as being business or engineering students. A deliberate attempt is made to adjust equality between males and females while asking students to fill in. All questionnaires are filled around noon as these are the hours when maximum number of students are present in the universities. The whole data are collected in the month of November.

Results and discussions
The model is quite a complex model, attempting to combine three different constructs as explained in the questionnaire. The flow diagram of the analysis is given in Figure 1.

The analysis is conducted by R (using library lavaan (Rosseel, 2012) for the analysis and semplot (Epskamp and Stuber, 2017) for the path diagram). Figure 1 is actually a re-drawing of the plot produced by R showing the flow and the make-up of the analysis (the real plot is too messy and cluttered to show this flow and make-up).

The structural equation model is developed by using generalized least squares (GLS) estimation (the conventional maximum likelihood estimation is not possible due to non-normality issue (Siddiqi, 2014)) with asymptotic distribution free function, as proposed

Figure 1.
Teachers’ efforts translate into students’ development through their engagements to classes
by Browne (1984), and given by:

\[ F_{GLS} = \left( \frac{1}{2} \right) \text{tr} \left( \left\{ S - \sum (\theta) W^{-1} \right\}^2 \right). \]

with \( S \) being an estimator of \( \sum (\theta) \) and \( W \) is a weight variable, usually taken as the inverse of the covariance matrix (Olsson et al., 2000). The GLS is obtained by minimizing the difference between \( S \) and \( \sum \) after weighting it by \( W \). The standard errors are estimated using bootstrap, primarily to tackle the issue of non-normality (Siddiqi, 2014). Typically, in the bootstrap technique, a large number of samples, usually 500 or 1,000 (Nevitt and Hancock, 2001; 2004), are drawn with replacement which create a mini sampling distribution (Bollen and Stine, 1993; Yung and Bentler, 1996), and based on the central limit theorem, it should have desirable distributional characteristics. These bootstrap samples are used to compute standard errors which are used in subsequent statistical tests of significances.

The structural model, as given in Figure 1, is estimated, using the \( F_{GLS} \) function given above. This model has to be corrected for different model-fit indices for an overall model acceptability using modification indices available in \textit{lavaan} library. Like CMIN = 316.938, RMSEA = 0.047 (with 90\% CI: LO = 0.038, HI = 0.055 ), PCLOSE = 0.730, GFI = 0.913, AGFI = 0.893, PGFI = 0.739, CFI = 0.902, NFI = 0.793, RFI = 0.767, IFI = 0.903, TLI = 0.889, PRATIO = 0.890, PNFI = 0.706, PCFI = 0.803, ECVI = 1.265 (with 90\% CI: LO = 1.124, HI = 1.432 ), MECVI = 1.286, AIC = 234.511 (saturated model: 272.000, independent model: 1728.728), BCC = 239.742 (saturated model: 290.721, independent model: 1,730.931), BIC = 475.900 (saturated model: 1,135.915, independent model: 1,830.365), CAIC = 408.541 (saturated model: 894.843, independent model: 1,802.004). All these ratios and indices are well above the specific satisfactory thresholds for these ratios and indices. A detailed description of these model-fit indices is available in any standard text in structural equation modeling like Bowen and Guo (2011).

The mediated regression involves a direct relationship between Students’ performance (the dependent variable, DV) as depends upon teachers’ efforts (the independent variable, IV) as represented by the path \( c \), and an indirect relationship between DV as depends upon IV through students’ engagement with their classes (the mediator, \( M \)) as represented by the path \( c' \). As a matter of fact, the path \( c' \) is a combination of the relationship showing how \( M \) depends on IV as represented by the path \( a \), and the relationship showing how DV depends on \( M \) as represented by the path \( b \).

The statistical literature presents mainly three distinct methods for conducting a mediated regression: first is Baron and Kenny’s (1986) approach which furnishes the presence of mediation without formally testing its statistical significance. It requires the statistical significance of the paths \( c, a \) and \( b \) and then a smaller \( c' \) as compared to \( c \). Second, Sobel’s (1982) test furnishes the statistical significance of the mediation. It requires that the product \( ab \) as statistically significant which is calculated through its ratio with its standard error, \( \sigma_{ab} \). By definition, such a ratio is distributed as student \( t \) distribution (Li, 1957). There exists, however, three different versions to estimate this \( \sigma_{ab} \) respectively, be Aroian (1947), Goodman (1960) and by Sobel (1982) himself vary in the formulas to combine standard errors of \( a \) and \( b \). Sobel (1982), being the latest, is usually considered to be a better combination. Sobel’s (1982) test is superior to that of Baron and Kenny’s (1986) approach but suits better to larger samples and marred with lesser statistical power (Preacher and Hayes, 2004; Preacher and Leonardelli, 2001). Third, Preacher and Hayes (2004) introduced the concept of bootstrapping to develop confidence intervals for the indirect effect, calculated by the product \( ab \). This confidence interval is used to establish the statistical significance of the mediation; same sign of lower and upper boundary values of the confidence interval indicates statistical significance.
Table I shows the results of the mediated regression.

All $c$, $a$, and $b$ are statistically significant; at least at 5 percent, while $c'$ is smaller than $c$. This furnishes, as per Baron and Kenny’s (1986) approach, the mediation role of students’ engagement with their classes for the relationship between students’ performance and the teachers’ efforts in the classes. The product $ab$ is statistically significant, at 5 percent, which furnishes, as per Sobel’s (1982) approach, the statistical significance of the mediation role of the students’ engagement with their classes for the relationship between students’ performance and the teachers’ efforts in the classes. The bootstrap process, as enunciated by Preacher and Hayes (2004), yields a 95% confidence interval of $\{0.129, 0.371\}$ for the product $ab$. This also renders the mediation role of students’ engagement to their classes as statistically significant for their performance in the classes.

The deviation test, based upon the difference of the log likelihood values, as calculated by using the already defined, $F_{GLS}$ of the null and saturated model, which gives the fitness of the overall model, and yields a $p$-value of 0.078 and 0.073 (not shown in the table) for the relationships showed in paths $a$ and $b$, respectively. Such large $p$-values cast doubts on the appropriate or singleness of the IVs in the models shown in $a$ and $b$ (Venables and Ripley, 1999). In non-statistical words, these $p$-values indicate the presence of some other variable, either as another IV, dummy, moderator or mediator, which is important enough to be included in the model. Without losing the specificity, the analysis may be split, here in this paper for dummy variables like gender of the students, being male and female; type of the students, being engineering and business students; and type of the ownership of the institute, being public and private sector. As a matter of fact, gender may not be a good dummy variable for the model under consideration as deliberate efforts are usually made in almost every institute of higher education to provide equal opportunities to both sexes. However, the other two variables may be the reasons of larger $p$-values.

A re-analysis of the data, for the split data, on the basis of the type of students, is done to develop separate structural models each for engineering and business students. The model needs to be refit for the two types of students. The structural model, as given in Figure 1, is estimated, using the $F_{GLS}$ function given above. This model has some constrained estimation (due to smaller size of the split sample) and needs to be fixed either to zero or some other value. Further, it requires a few tweaking on the basis modification indices to correct the model for fitness ratios and indices. The results are shown in Table II.

Baron and Kenny’s (1986) approach renders the mediation role of students’ engagement as present for students from the business schools while for students from engineering schools this role could not be substantiated as the direct role (in path $c$) is not significant (which is one of the compulsion for this approach). However, Baron and Kenny’s (1986) approach loses its credibility here as it is good only for large samples. As far as Sobel’s (1982) test and Preacher and Hayes’ (2004) approach are considered, this mediation role is statistically significant. This shows that the mediation role of students’ engagement is statistically significant for both engineering and business students. The difference between the $\beta$ values (path $c'$) of the two types of schools is statistically insignificant with student

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Direct model</th>
<th>Indirect model</th>
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<tbody>
<tr>
<td></td>
<td>$\beta$</td>
<td>SE</td>
</tr>
<tr>
<td>Teaching efforts</td>
<td>$c$</td>
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</tr>
<tr>
<td>Students engagement</td>
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<td>$-$</td>
</tr>
<tr>
<td></td>
<td>$-$</td>
<td>$-$</td>
</tr>
<tr>
<td>Total</td>
<td>$c'$</td>
<td>0.585</td>
</tr>
</tbody>
</table>

**Note:** Dependent variable: students’ performance

**Table I.** Mediating regression analysis for all students

Students’ engagement to their classes
$t$-value of 2.567 ($p$-value = 0.221). For business students, the engagement factor is more prominent (observe the difference between $c'$ and $ab$ in Table II) as compared to the engineering students.

The re-analysis of the data, when split is made with respect to the ownership of the university, being either public or private, reveals very interesting results as shown in Table III.

The mediation role of the students’ engagement to their classes is not substantiated either using Baron and Kenny’s (1986), Sobel’s (1982) or Preacher and Hayes’ (2004) approach in case of public sector universities in stark contrast to private sector universities. The difference between the $\beta$ values (path $c'$) of the two types of schools is statistically insignificant with student $t$-value of $1.476^{**}$ ($p$-value = 0.021). What is so special with universities of private sector or what is wrong with universities in public sector? The answer requires a separate study. However, observations are quite straightforward. For public sector universities, teachers are not able to develop engagement among the students to their classes; path $a$ is not statistically significant. One needs to conduct a separate study to rummage this insignificance; however, a common observation may relate this to the superiority perception of the students at the public sector universities. As a matter of fact, the public sector universities attract comparatively more intelligent students for being less expensive as compare to private sector universities. This may results in the creation of superiority perception among these students which makes them oblivious to the classrooms. However, this is mere conjectural and requires scientific study to establish. And, since there

### Table II.
Mediated regression analysis split for engineering and business students

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Direct model</th>
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<td></td>
<td>$\beta$</td>
<td>SE</td>
<td>$p$</td>
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<td>SE</td>
<td>$p$</td>
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<tr>
<td><strong>Engineering students</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Teaching efforts</td>
<td>$c$</td>
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<td>0.197</td>
<td>$a$</td>
<td>0.537</td>
<td>0.119</td>
</tr>
<tr>
<td>Students engagement</td>
<td>$b$</td>
<td>1.014</td>
<td>0.128</td>
<td>0.000</td>
<td>$ab$</td>
<td>0.545</td>
<td>0.135</td>
</tr>
<tr>
<td>Total</td>
<td>$c'$</td>
<td>0.250</td>
<td>0.216</td>
<td>0.027</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Business students</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching efforts</td>
<td>$c$</td>
<td>1.235</td>
<td>0.230</td>
<td>0.000</td>
<td>$a$</td>
<td>0.364</td>
<td>0.124</td>
</tr>
<tr>
<td>Students engagement</td>
<td>$b$</td>
<td>0.924</td>
<td>0.123</td>
<td>0.000</td>
<td>$ab$</td>
<td>0.336</td>
<td>0.121</td>
</tr>
<tr>
<td>Total</td>
<td>$c'$</td>
<td>0.898</td>
<td>0.215</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Dependent variable: students’ performance

### Table III.
Mediated regression analysis split for public and private sector universities

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Direct model</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$</td>
<td>SE</td>
<td>$p$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Public sector</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching efforts</td>
<td>$c$</td>
<td>0.185</td>
<td>1.028</td>
<td>0.571</td>
<td>$a$</td>
<td>0.134</td>
</tr>
<tr>
<td>Students engagement</td>
<td>$b$</td>
<td>0.084</td>
<td>0.723</td>
<td>0.546</td>
<td>$ab$</td>
<td>0.011</td>
</tr>
<tr>
<td>Total</td>
<td>$c'$</td>
<td>0.215</td>
<td>0.816</td>
<td>0.694</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Private sector</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching efforts</td>
<td>$c$</td>
<td>0.938</td>
<td>0.130</td>
<td>0.000</td>
<td>$a$</td>
<td>0.466</td>
</tr>
<tr>
<td>Students engagement</td>
<td>$b$</td>
<td>1.034</td>
<td>0.126</td>
<td>0.000</td>
<td>$ab$</td>
<td>0.482</td>
</tr>
<tr>
<td>Total</td>
<td>$c'$</td>
<td>0.471</td>
<td>0.218</td>
<td>0.031</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Dependent variable: students’ performance
does not exist any engagement, teachers’ efforts and the diligent performance could not be translated into the students’ development.

An analysis is also conducted to appreciate the difference, if there exist any, between the two genders for the mediated role of their classroom engagements. However, the statistical analysis (not shown in the tables) could not differentiate between them.

**Concluding remarks**

The vernacular version of the education emphasizes the role of teacher for the progress and development of the students with more the efforts made by the teacher, better are the students, while the more recent version emphasizes the role of pedagogical process of the education, including the material, policies, etc., responsible for the development of the students. Both of these versions focus on a direct relationship between a teacher’s efforts and the students’ development. Here, in this paper, the directness of this relationship is challenged and have been hypothesized that the teachers’ efforts develop engagement experience for the students for their class, and it is the engagement factor which is actually responsible for the development and progress of the students; better the engagement, better is their development. In other words, the students’ engagement to their classes is a mediation factor for the relationship between teachers’ efforts and the students’ developments.

For data analysis purposes, the paper is taking its variable set from the social learning theory, which governs the behavior of the teacher; the pedagogical theory, which governs the whole education process and mechanizes the teachers’ efforts; and the students’ engagement theory, which governs the experience develops in students due to these effects.

The scope of the paper is being limited to higher education only for a better understanding of the inherent dynamics. A random sample of students is taken from a couple of business and engineering students by distinguishing them into public- and privately-owned universities. Further, a deliberate care has been taken to select (almost) equal number of males and females. A mediated regression analysis, using Baron and Kenny’s (1986), Sobel’s (1982), and Preacher and Hayes’ (2004) approaches, is conducted to establish the mediation role of students’ engagement for the presumed direct relationship between teachers’ and system’s effort and students’ development.

It has been established that their traditional direct relationship is due to a mediator which is students’ engagement to their classes. This mediation is statistically significant. In other words, the teachers’ efforts and performance generate an engagement experience for the student, and it is this experience which motivates students to excel and develop. It has been further established that the mediation is equally effective for both the genders, i.e. gender is not a moderator for the mediation. Further, this mediation is also identical for the two types of students selected for this study. In other words, the mediation is not moderated by the type of students. And the results hold for all types of students. However, the type of school’s ownership is a moderator for this mediation; the mediation is not statistically significant for public sector universities. The analysis does show that this may be due to an insignificant relationship between teachers’ efforts and the engagement experience developed in the students, and the insignificant relationship between this engagement and development and progress. It is a common observation that publically owned universities attract intelligent students due to their lesser tuition fees, which results in a strictly merit-based admission in these institutions. And these intelligent students think themselves capable enough for their progress and development. However, this is quite farfetched reasoning and requires a separate study for its validation.

The investigation carried out in this paper signifies the role of students’ classroom engagement as being a mediator between what a teacher makes efforts for and what actually the students become. It has been established that the students’ growth not merely depends upon a teachers’ personality, knowledge, assessment-tools, etc., but upon the environment which it manages to make in the classroom.
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Development of mobile application through design-based research

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Abstract

Purpose – The purpose of this paper is to illustrate the development and testing of an innovative mobile application using design-based research.

Design/methodology/approach – This paper reports on the process of transformation of existing printed course material into digitized content through design-based research where design, research and practice were concurrently applied through several iterations of the mobile application. For this transformation, one session each from BSc in Nursing, Bachelor of Pharmacy and Bachelor of Medical Laboratory Sciences was selected. In the first phase of the design-based research, the main research question was formulated. In the second phase, a mobile learning application (OUSL MLearn) was designed and developed to address the research question. In the third phase, this application was evaluated by five groups of stakeholders: content experts to validate the content; educational technologists to check the alignment of technical and pedagogical features; novice users to check the overall effectiveness of the application; developer to develop the application, to check the ease of usage; and researchers to identify the impact of this innovation. These stakeholders were closely involved throughout the whole process which lasted over a period of four months. At the end of this development phase, the results were reflected upon and used for further enrichment.

Findings – It was observed that the developed mobile application was accessible, appealing and pedagogically constructive for users. However, optimization, development time, technical and organizational issues, workload of academics and production costs were identified as major challenges.

Research limitations/implications – This study was based on the findings of a small sample of potential users.

Practical implications – The findings have implications for designing culturally adaptive interactive mobile applications.

Originality/value – This study will benefit practitioners to design culturally sensitive mobile learning courses and researchers to conduct design-based research.

Keywords Innovation, Instructional design, Pedagogy, Design-based research, Mobile learning, Open and distance learning

Paper type Research paper
1. Introduction
Mobile technology is an exceptionally fast-growing field that is closely connected with our work and day-to-day lives. There are new developments added to its growth every day with emerging new patterns of usage, having both positive and negative implications.

In the twenty-first century, higher education institutions had to be reconstructed to adapt to changes with the increasing global competition, the growing need for higher education, the changing nature of information, rapid developments in Information and Communication Technologies (ICT) and the varying expectations and demographic features of learners (Kukulska-Hulme, 2005a). The changes in the dynamics of ICT, institutions and learners influence the academics working in higher education institutions to change their teaching approaches and strategies.

However, we have not seen a noteworthy adoption of these technologies in the education sector even though they are available everywhere (ubiquitous) and have tremendous potential in addressing needs of the individual learner through their unique capabilities. Furthermore, owing to the rapid changes of mobile technologies, including devices and communication technologies have opened up new research opportunities and even change the focus of research (Parsons, 2014). Krull and Duart (2017) reported that in higher education, mobile learning is a growing field of research as evidenced by reviewing journal publications between 2011 and 2015. The major results of their study were that the most researched theme was on m-learning applications and systems, used both quantitative and qualitative studies and were targeted at students. As both faculty and student adoption play a crucial part in the success of mobile learning initiatives, they recommend future studies to look into the implications for both faculty and students.

However, there is a scarcity of research articles related to mobile learning and methodological frameworks for designing sustainable mobile learning activities (Nouri et al., 2016). The purpose of this research study was to address this gap by applying design-based research in designing a mobile learning solution for the undergraduates of the Faculty of Health Sciences of the Open University of Sri Lanka (OUSL). It reports on the findings of the testing phase of the mobile solution by five groups of stakeholders: content experts, educational technologists, developer, novice users and researchers prior to the delivery of the first cycle.

The first section of the paper defines briefly the mobile learning, design-based research and employing design-based research in mobile applications, and stresses the importance of conducting design-based research for future technological innovations. The second section briefly describes the context. The third section examines the methodology adopted for the design-based research for new technological innovations in teaching learning using mobile applications. The fourth section is dedicated to the findings which were collected from all the stakeholders illustrating the potential for innovative teaching practices through mobile learning. The final section is a critical examination of the viewpoints expressed by all stakeholders and formulating guiding principles for both designing mobile learning solutions and on how to conduct design-based research in mobile applications.

2. Theoretical framework
2.1 Mobile learning
Mobile devices are portable, lightweight devices such as mobile phones (cellphones, or handphones), smartphones, palmtops and handheld computers (Personal Digital Assistants or PDAs), tablet PCs, laptop computers and personal media players. These devices can be carried around easily and used for communication and collaboration, and for teaching-learning activities that are different from what is possible with other media.

Traxler (2009) has pointed out that mobile devices together with mobile communication technologies have influenced all fields including education and currently undergoing a
transformation. In fact, he called this transformation period as *mobile era*. He further stressed that most of these mobile devices are not designed specifically for education or training but designed for personal or individual usage which mainly used for one-to-one social interaction.

In the context of education, these mobile devices offer diverse learning opportunities such as portability, social interactivity, context sensitivity, connectivity, individuality and affordance to people in academic settings or non-academic settings (Crompton, 2013). Therefore, these mobile technologies are very useful for learners where they could engage in educational activities and learn by themselves without the constraints of having to come into the institution.

Since the introduction of the term mobile learning in 2005 (Crompton, 2013), many scholars and practitioners have attempted to define it and initial definitions were focused solely on devices and technologies or *techno-centric* (Crompton, 2013; Keskin and Kuzu, 2015). Most widely accepted mobile learning definition is “learning across multiple contexts, through social and content interactions, using personal electronic devices” (Crompton, 2013, p. 4). This definition encompasses four central constructs associated in mobile learning: pedagogy, technology, context and social interactions. Table I illustrates the categorization of the attributes of mobile learning into these central constructs.

With these attributes, it has much in common with other types of e-learning on desktop computers but allows more diverse and changing locations, more immediate (anytime) interaction, and connect through smaller, often wireless devices (Kukulska-Hulme, 2005a) enabling both advantages and drawbacks.

Learners can choose their own learning path to achieve their learning goal by using their own private mobile device. Hence, mobile learning can take place when the learner is not at a fixed, predetermined location or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies (O’Malley *et al.*, 2005, p. 7). As a result, they have spontaneous personal accesses to the large number of learning resources via the internet.

However, in order to create this kind of ambient technology, providers need to design “learning enhanced” buildings and public spaces, by providing devices or establishing systems to respond to on-the-spot interactions.

Several researchers have studied the development of the theoretical frameworks of mobile learning: mobile education (FRAME) based on activity theory (Koole, 2009), construction of knowledge through the exchange of knowledge via pervasive mobile devices (Sharples *et al.*, 2007) based on the conversation theory, developed by Pask (1975), modification of transactional distance education theory for mobile learning (Park, 2011) and educational research on mobile communities (Frohberg, 2003).

Still there is a lack of transferable design frameworks on mobile learning (Cochrane, 2013) irrespective of those developed earlier. There is a greater need by the practitioners,
When designing instruction, generally learning content is regarded as the most important factor. Thomas et al. (2002) stressed that culture has to be considered as a “dimension" of instructional design capturing, three layers: purposeful intention, interaction with learners to involve them in the design process and for introspection to identify one’s own cultural values and biases. The importance of language, culture and context is also highlighted in teaching and learning (Gunawardena et al., 2009). Chen et al. (2006) emphasized the importance of paying attention to provide support (technical, learning and social) and resources (language, culture and context, and learning content), so that learners can make effective connections between resources and the support. Therefore, designing effective learning for global audiences requires not cultural neutrality but cultural “inclusivity” (Frechette et al., 2014; Henderson, 1996; Powel, 1997) as the online medium (internet) itself is a culturally derived phenomenon (Bowers, 2000) and functions as an incubator for a shared cultural experience (Selvin, 2000). Therefore, it is crucial to explore the “cultural understanding” of learners (Rogers et al., 2007). Furthermore, online tutors and mentors should be more sensitive to culture when facilitating knowledge construction to global audience via online where both learners and tutors bring their own cultural identities and they have to use face-saving and negotiation strategies to build trust to develop online communities (Gunawardena and Jayatilleke, 2014; Gunawardena et al., 2009).

The value of universal design concept has been argued as one of the best practices for learning to design standards-based lessons (Rao and Meo, 2016) and in creating culturally inclusive online course materials (Eberle and Childress, 2006; Rose and Meyer, 2000). It allows learners to select from different methods of instruction (reading learning resources), modes of expression (typing a response) and means of interaction (synchronous or asynchronous communication) (Frechette et al., 2014) to accommodate culturally different diverse learners. Emergence of a unique online visual culture is observed by mobile phone users by blending spoken and written languages or orality and literacy in communication. They produce various visual representations using both words and oral expressions interchangeably while on the move (Rha, 2014, p. 47). They develop various techniques combing literal properties of written characters to deliver their messages expressing emotions using:

- abbreviations (e.g. lol: “laugh out loud,” yolo: “you only live once”);
- hieroglyphics (e.g. xoxo: “hug kiss hug kiss,” T-T: “tears”;:-: “smiling eyes”), add a new bullet emotions; and
- special characters, which are unique visual representations and difficult to classify as wither text or image.

It also is necessary to get the views from learners on the designed product to shape the design itself (McLoughlin and Oliver, 2000) through evaluation studies.

2.2 Design-based research

The aim of the design-based research is to improve educational practices through systematic but flexible methodology through iterative analysis throughout the design, development and implementation of the product (Wang and Hannafin, 2005, pp. 6-7). These educational practices are based on the views gathered between researchers and practitioners in a normal setup and these practices would lead to formulate contextually
sensitive design principles and theories (Wang and Hannafin, 2005). Thus, fulfilling the ultimate goal of design-based research by building stronger connection between educational research and real-world problems. In this scenario, researchers and practitioners are integral part of the research process and they are closely involved from the initial phase of design and development of the product to the final phase of implementation. However, research validity of design-based research is criticized by some due to the involvement of researchers where they felt that researchers may not be reliable and faithful in their judgments (Barab and Squire, 2004). Further, the intervention may not be replicated in other settings as design-based research is contextually dependent (Design-Based Research Collective, 2003).

Review conducted by Zheng (2015) showed that design-based research studies were conducted with diverse sample groups but mainly with students in higher education (29 percent), under various learning environments including distance learning (14 percent) and blended learning settings (12 percent). Natural science (38 percent) was selected as the most researched learning domain while medical science was the least selected learning domain (2 percent). The technological intervention was the major type of intervention used in the design-based research (53 percent) followed by the integrated teaching models (16 percent), other models (16 percent) and instructional methods (14 percent).

Research methods used in design-based research were mostly qualitative in nature (Zheng, 2015) but recently, there is a trend in using big data to refine designs and to build theory (Svihla, 2014). However, many researchers have pointed out the unavailability of established research process and guidance on how to conduct design-based research (Dede, 2004; Design-Based Research Collective, 2003; Engeström, 2011). While supporting the uncertainty about the research process carried out in design-based research, Easterday et al. (2014, p. 317) further identified three problems in design-based research:

1. uncertainty about how it differs from other forms of research;
2. uncertainty about how it differs from design, or why design is not research; and
3. uncertainty about what might make it effective (if it is).

In view of these uncertainties, they described the design process consisted of six iterative phases: focus the problem, understand the problem, define goals, conceive the outline of a solution, build the solution and test the solution (Easterday et al., 2014, p. 320) which are recursively nested within each other. These phases could be compared with the well-researched four-step framework of Reeves (2006), where he explains design-based research as a process that consists of four steps (Table II).

It is clearly evident from the table that the fourth step, that is documentation and reflection to produce design principles of Reeves’s framework, was not identified in Easterday et al.’s six-phase/step framework.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>First step</td>
<td>Analysis of practical problems by researchers and practitioners</td>
<td>Focus the problem</td>
</tr>
<tr>
<td>Second step</td>
<td>Development of solutions within a theoretical framework</td>
<td>Understand the problem</td>
</tr>
<tr>
<td>Third step</td>
<td>Evaluation and testing of solutions in practice</td>
<td>Define goals</td>
</tr>
<tr>
<td>Fourth step</td>
<td>Documentation and reflection to produce design principles</td>
<td>Conceive the outline of a solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Build the solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test the solution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not identified</td>
</tr>
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</table>

Table II. Comparison of the processes of the design-based research of Reeves’s (2006) and Easterday et al.’s (2014) framework.
Ma and Harmon (2009) pointed out that the guidelines and the process presented by Reeves’s (2006) four-step framework provided valuable guidance on how to conduct design-based research from the long-term perspective; however, they felt the inadequacy of the framework to conduct design-based research at the individual level as it was not clear about the conduct of research activities in each step. They further enriched the Reeves’s framework by providing a more detailed and comprehensive development process incorporating research elements to the framework with specific guidance (Ma and Harmon, 2009, pp. 77-78). The main steps in the framework are connected linearly from steps 1 to 4 with connecting loops to each step. They mentioned that “by no means as clean and linear as it might appear” and “researchers may examine their own context to make appropriate modifications” (p. 80). These guidelines enable researchers who are new to design-based research to conduct design-based research systematically and logically.

Both design-based research and action research share many epistemological, ontological and methodological foundations thus sharing a common “meta-paradigm” pragmatism (Cole et al., 2005) and many find it difficult to distinguish the two (Easterday et al., 2014). Generally, design-based research is conducted by a research and design team whereas action research is carried out by a single teacher (practitioner), guided by a theory (Anderson and Shattuk, 2012), focused primarily on already designed product/process and its application into an everyday context (Ørngreen, 2015) and contributes toward theory building (Cole et al., 2005). However, collaboration between practitioners and researchers is not clearly described in the design-based research literature (Kolmos, 2015) and needs further investigation.

However, some researchers have combined design-based research with action research (Keskin and Kuzu, 2015). They feel that the research methodology most appropriate to the third step of the Reeves’s framework is through action research. It can make the product highly effective, efficient and useful by allowing repeated development of the product until all the identified errors of the product are resolved during the testing phase (Susman and Evered, 1978). In view of this notion, Keskin and Kuzu (2015) developed the model by combining the design-based research model put forward by Ma and Harmon (2009), and the action research cycle suggested by Susman and Evered (1978) regarding information systems. The model also has the same four steps proposed in the Reeve’s framework; however, all the steps in the Keskin and Kuzu’s model are interactive with each other. The design principles and the theory can be developed in the fourth step, based on the analyses of the data collected in each step (Ma and Harmon, 2009). By following iterative research process in the design-based research, it attempts to refine the innovation systematically while also proposing design principles unlike in evaluating innovative product or intervention at the end of the development phase.

### 2.3 Mobile applications employing design-based research

Many researchers have conducted reviews related to the application of design-based research as a research methodology in conducting various research studies (Anderson and Shattuk, 2012; Krull and Duart, 2017; Zheng, 2015). Major findings of these studies indicated that the majority used design-based research for technological interventions and applications. Anderson and Shattuk (2012) reported that the majority of interventions (68 percent) involved the use of online and mobile technologies. According to Zheng’s study reviewing research articles and publication from 2004 to 2013, technological interventions applications were the most researched area (53 percent) and were to test the effectiveness of the learning environment or a particular tool. However, the nature or the type of the tool was not specifically mentioned in his study. In reviewing journal publications between 2011 and 2015, Krull and Duart (2017) revealed that mobile learning applications and systems were the most researched area conducted using design-based
research in higher education. Keskin and Kuzu (2015) combined design-based research and action research to conduct professional development program for academics using M-learning system.

3. Context
The OUSL is unique in its teaching methodology as it is the only national university in Sri Lanka which is dedicated to open and distance learning. Unlike in conventional universities, the OUSL mediates instructions mainly through print course materials. With the advent of various technologies, the OUSL has gone through generations of technology integrating audio-visual, multimedia and online learning into the core print course materials (Jayatilleke et al., 2009).

Having faced with many challenges with respect to distributing printed course material on time and to reduce production and delivery costs of the course materials, there have been many suggestions from time to time to use other technologies. However, print has remained as the core medium of instruction even though many such initiatives have been taken to promote offering courses entirely online.

Aligned with this notion and also considering the immense potential of using mobile technologies for learning, the OUSL has recently proposed an alternative option to address these challenges. Providing course materials in PDF format loaded on a tablet computer would be a viable option as tablet computers are becoming cheaper by the day, harnessing the potential of improving the learning experience and thereby effect institutional change.

Hence, Faculty of Health Sciences of the OUSL took the initiative to investigate the viability of transforming the existing print course material, and offer them through mobile learning for the undergraduates of the Faculty. This project was carried out from a research grant of the OUSL which enabled to experiment with novel mediating mobile technologies.

Three Bachelor’s degree programs are offered by the Faculty of Health Sciences; Nursing; Medical Laboratory Sciences and Pharmacy. One session each from a degree program was transformed retaining the already existing content and the original framework as these courses are still being offered by the OUSL.

4. Methodology
In this study, design-based research model put forward by Ma and Harmon (2009) was used as the framework as it provided the processes clearly (Figure 1). The “analysis of practical problems” is the first phase as in the Reeves’s model. In this phase, a practical problem is identified and the related literature about the practical problem is reviewed. The second phase is “development of solutions” for the practical problem identified in the first phase by conceptualizing a solution within theoretical framework, identifying research purpose and development method, developing a prototype that serves to address the research problem. The third phase is “evaluation and testing of solutions in practice.” The final phase is “documentation and reflection” where design principles are generated and documented in order to provide guidance for practitioners and researchers who are interested in conducting design-based research.

This study was also influenced by the design-based action research model put forward by Keskin and Kuzu (2015) where phase 3 is an iterative cycle rather than a linear process. In this phase, problems related to the prototype are recognized and action plans are developed. At the implementation, these plans are implemented and the consequences of the action are evaluated and reflected. This process continues until all problems are solved.

In this study, development and testing of the mobile application (phase 3) was carried out concurrently with the phase 2 through formative evaluation. Phase 2 and phase 3 were closely linked and phase 3 was incorporated in the phase 2 of the cycle (Figure 1). These two phases were not separated cycles as in Keskin and Kuzu’s model. Since phase 4
(documentation and reflection) was also closely connected with these two phases through reflection, the connection between phase 3 and 4 was illustrated in a two way arrow.

Since design-based research is a multi-phase study, the present study involved five groups of stakeholders. In this study, researchers took the initiative and were involved from the beginning of the design process together with the developer, content experts/practitioners and educational technologists. All these stakeholders were closely involved throughout the whole process which lasted over a period of four months. The formative evaluation was carried out with four content experts, four educational technologists, six novice users, four researchers and one developer.
4.1 First phase – analysis of a practical problem

4.1.1 Identifying a practical problem. The analysis of a practical problem by researchers and practitioners is the first phase of this design-based research. Researchers in this study are also practitioners: two are teaching zoology/health courses while other two are training academic staff on online learning/educational technology. They have experienced the practical problem faced by the OUSL for many years; that is the difficulty in producing timely printed course materials to OUSL students with increasing student numbers. This practical problem is equally important to both OUSL students and the institution (OUSL). Thus, researchers took the initiative to conduct this research study through design-based research, where they felt the problem was significant to the learning community of the OUSL. They also believe that the findings will provide evidence to inform decision makers on the viability of providing a tablet computer loaded with the content to students so that decision makers may be in a position to take data-driven decisions rather than taking ad hoc decisions.

4.1.2 Reviewing the literature to determine the significance of the problem. An earlier study carried out with the students of the British Open University showed that the majority preferred e-books as a complementary technology and still would like to receive print course materials (Kukulska-Hulme, 2005b, p. 130). Researcher further reported that learners faced difficulties in downloading e-books, getting satisfactory page and font size, navigation and cursor control, etc. With many technological advancements over the years, still students perceive printed texts are easier to read, understand and navigate, and have long-term access even though the digital texts are becoming cheaper (Baglione and Sullivan, 2016). Comparative studies have been conducted to investigate the effects of digital reading (e.g. reading a word or PDF file on screen) with print reading; however, not much research has been carried out into examining learners reading behaviors and the educational benefits of recent, more flexible visually presented texts (Rha, 2014, p. 51). Rogers-Estable (2018, p. 48) reported that many faculty members commented that if electronic texts (eTexts) are purely PDF files (or glorified PDFs) then there is no advantage in using them with students.

Based on the literature review, the decision was taken by the research team, not to provide a digitized text as a PDF (or as a glorified PDF) to learners (as an e-book) but to provide a mobile learning application with enhanced version of the already existing print material with additional pedagogical, technological (interactive), contextual and social interactive attributes associated with mobile learning with innovative strategies and tools. Social interactive attributes inherent to mobile learning was used; however, less priority was given to design peer/tutor interactions in this mobile application as it was designed as a stand-alone package to study offline considering the specific requirements of the target group, that is health professionals with demanding work pressure. However, learners have the opportunity to use the mobile application either online or offline. They can also use other channels such as e-mail and social media to discuss the content if they wish to collaborate socially.

4.1.3 Identifying the purpose and research questions for a development iteration. According to Ma and Harmon (2009), identifying the purpose and research questions for a development iteration was discussed as the third step in the second phase (p. 77) even though they have highlighted the importance of it before commencing the development (p. 80).

In this study, research questions were formulated in the first phase as it was felt necessary to identify the purpose and the research questions before starting the development as they will direct and guide the development process through research.

The following research questions were formulated after analyzing the practical problem:

**RQ1.** How to design a mobile application using an existing print course material?

**RQ1a.** What was the process carried out when transforming the existing print materials into mobile application?
What types of interactivity features were added to the mobile application?

What were the challenges faced by content experts, developer and educational technologists when designing mobile application?

4.2 Second phase – development of a solution

4.2.1 Conceptualizing a solution within a theoretical framework. In the second phase, a mobile learning application called “OUSL mobile learning” (OUSL MLearn) was designed and developed specifically for the Android mobile devices to address the principle research question within the theoretical framework.

The existing print course materials were originally designed based on teaching and learning theories such as Guided didactic conversation in distance education (Holmberg, 1983). However, transformation of existing printed course material into digitized content requires additional research related to mobile learning such as designing content with in-built interactive features for mobile devices. Furthermore, learning is situated and contextual. Thus, research and practice were concurrently applied through design-based research with several iterations of the mobile application.

4.2.2 Determining the role of research in developing the solution. Having conceptualized the solution, next step was to decide whether research should be conducted while developing the solution. Since the solution in this study was to develop a mobile application through several iterations, research was an integral part and relevant research studies with respect to the needs and the requirements of the stakeholders (teachers and students), learning preferences of students, cultural propensities were considered when designing user-interface, content development and system technical design.

4.2.3 Identifying development methods. This mobile application was based on the existing content of the printed material thus, restricting the design and development of the mobile application. Therefore, first step was to develop a prototype that was adequate for the purpose. Having reviewed the literature on various types of prototypes, an icon-based prototype was selected for the development of mobile application as the majority learners are visual learners (Rha, 2014).

4.2.4 Developing a prototype that serves the research purpose. In order to develop the mobile application, the first meeting was conducted with the content developers, educational technologists, researchers and the developer and discussed the overall objectives of this project. Three sessions (one session per a degree program) of the existing print materials were handed over to the developer highlighting the requirements, providing necessary information and devices (tablet computers). Developer was given the freedom to select appropriate technologies and tools to develop the mobile application to use with the specified tablet computer. This decision was based on the assumption that the OUSL will provide the standard tablet computers to all OUSL learners rather than requesting them to purchase or use their own tablet devices in order to minimize the technical problems. HTML was the main tool for the development and other tools were also used to enhance the capabilities of the mobile application.

First iteration was to discuss the prototype for the development of the session structure and subsequent iterations developed the prototypes for the course structure and the system architecture. Interactive features such as self-assessments questions and embedding videos were incorporated later.

The following section will describe in detail the design of the OUSL MLearn mobile application.

System architecture and implementation. The system architecture was designed for the entire university which serves as the mobile platform (OUSL MLearn) for the OUSL. In order to make the system user friendly, the unique icon-based system was designed (Figure 2(a) and (b)).
The navigational structure for this system was connected to the main pages forming a semantic network as illustrated in Figure 3. The icon-based system was connected to the home page of the system, then to the Programmes Page where students can select their own program, followed by the Course Page and the Session Page, respectively.

Course/session structure. Each course was designed in such a way to make the course as a stand-alone module which can be studied offline. This decision was made considering the baseline survey of the undergraduates of the Faculty of Health Sciences and their past experience of not accessing learning resources through internet (Jayatilleke, Wijesekara and Ranawaka, 2017).

The existing OUSL print materials were designed as self-instructional materials with intermittent activities to facilitate “guided didactic conversation” with text (Holmberg, 1983), incorporating advance organizers at the beginning and summaries at the end (Melton, 1997; Rowntree, 1990). These materials are designed using pedagogical features based on learning theories, research and practice.

These pedagogical features were retained in the mobile application. For instance, advance organizer at the beginning and summary at the end of each session were designed based on the pedagogical features of the original print course materials. Research shows that an advance organizer serves as a schema for the learner to associate new concepts with the already known concepts and to connect them meaningfully (Ausubel, 1960), whereas a summary (post organizer) provides a synopsis that helps the learner to get a holistic picture of the concepts learned in the session. In addition, advance organizers help diverse learners, in particular FD and FI learners, respectively. Research studies have revealed that FD learners are holistic in nature and need external guidance to solve problems while FI learners are serialistic and use their own cues to solve problems (Witkin et al., 1977). Since OUSL learners are diverse, course materials have to provide provision for these two groups.
to learn the content without the help of the teacher. However, content was re-designed as smaller chunks to suit the mobile screen to avoid overload of information based on Sweller’s (2011) cognitive load theory.

Additional features were also incorporated to accommodate specific requirements necessary to learn using mobile devices. Each session was transformed considering the four pedagogical aspects of instructional design, namely information design, instruction design, interface design and interaction design. Findings of the earlier research studies on online learning were also considered in designing this mobile application (Table III).

Figure 4 illustrates the screen casts of the animated instructions proving study guidance on how to use mobile device.

Printed course materials use icons in front of the major pedagogical components such as learning outcomes, self-assessment activities (activities), online/video integration, etc. and use them as access devices. These icons were specially designed as authentic learning objects to maintain the OUSL identity across all OUSL materials. These icons were also used in this mobile application to maintain the OUSL identity. These features could be considered as contextual attributes of mobile learning. Certain new icons were added to represent functional specific requirements associated with the mobile application (e.g. Menu, Note, etc.). Typical icons generally represented in global community were used to represent images and settings. The layout of the program control, learner control and specific icons is illustrated in Figure 5.

This mobile application integrated a video, enriching the existing content using the affordances of mobile technologies and designed as an activity activity, based on the video. Generally, OUSL students do not watch videos, unless they are compulsory or integrated in the course materials. Thus, research and practice were considered in the design and development of this mobile application in line with the guidelines of the design-based research (Figure 6).

In addition to the instructional design features, adaptive technologies were also incorporated in the mobile application considering the needs of the heterogeneous nature of OUSL learners (Jayatilleke, 2016). Table III illustrates these features. Learner has the opportunity to adjust the size of the font (Figure 7) and images, taking notes, highlighting the text and copying and pasting facility were some of the adaptive technologies used in this application.

The next section provides the detail account of the evaluation and testing phase of the mobile application.

4.3 Third phase – evaluation and testing of the solution

In the third phase, this mobile application was regularly tested through formative evaluation which was an integral part of the design methodology. It helped to judge strengths and weakness of the innovation while still at its developing stage, for the purpose of revising the instruction. As mentioned earlier, second and third phases conducted concurrently and could not be separated during the research process. Certain features were added after getting the feedback from various stakeholders during the testing phase.

4.3.1 Identifying research methods. In this phase, appropriate research methods were identified, collected and analyzed data to answer the research questions. Qualitative methods were used in gathering data since design and development of the innovation need in-depth analysis of the innovation. A research diary, committee meeting records, observational sheets of the users while using the tablet interview schedule for users, and checklists for error identification were used as data collection tools.

Content developers of these three sessions (four females), educational technologists (two females and two males), researchers (three females and one male) and one developer
<table>
<thead>
<tr>
<th>Categories of instructional design</th>
<th>Pedagogical (P)/Technological (T)/Contextual (C)/Social interaction (S) attributes</th>
<th>Research evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information design</td>
<td>As smaller chunks to suit the mobile screen</td>
<td>To avoid overload of information based on Sweller’s (2011) cognitive load theory</td>
</tr>
<tr>
<td></td>
<td>Static arrangements of text repositioned as visual objects</td>
<td>In line with technology affordances of mobile learning</td>
</tr>
<tr>
<td></td>
<td>Structured format</td>
<td>Preference for well-structured format by the Asian learners (Jayatilleke and Gunawardena, 2016; Jayatilleke, Kulasekara, Kumarasinha and Gunawardena, 2017).</td>
</tr>
<tr>
<td>Instruction design</td>
<td>Study guidance Animated instructions on how to operate the tablet computer at the beginning with skipping facility (Figure 4) Guidance when they have to rotate the tablet Learning outcomes at the end of a session Introduction as an advance organizer Summary Interactive glossary designed for the entire course</td>
<td>Preference for clear instructions on navigation and e-activities (Jayatilleke, Kulasekara, Kumarasinha and Gunawardena, 2017) In line with technology affordances of mobile learning Structure for ODL course materials based on Melton (1997) and Rowntree (1990)</td>
</tr>
<tr>
<td></td>
<td>T, S and C</td>
<td>Preference for clear instructions on navigation and e-activities (Jayatilleke, Kulasekara, Kumarasinha and Gunawardena, 2017) In line with technology affordances of mobile learning</td>
</tr>
<tr>
<td>Interface design</td>
<td>Simple navigational structure sequential arrangement of the content with activities</td>
<td>Preference for linear and sequential arrangement of content with one activity at a time and had difficulty of engaging multi-tasks concurrently specially among Asian/Eastern learners (Jayatilleke and Gunawardena, 2016; Jayatilleke, Kulasekara, Kumarasinha and Gunawardena, 2017; Ku and Lohr, 2003) Evidence to show that field dependent (FD) learners prefer program control options while field independent learners (FI) favor learner control options (Yoon, 1993) Flexibility of using both program and learner control option for navigation were used to provide linear (monochromic) and multi structure with multiple tasks (polychromic/parallel) to accommodate culturally diverse learners in line with the concept of universal design by providing multi strategies to accommodate diverse learners (Rao and Meo, 2016) Specific authentic icons as “access devices” (learning outcomes, activity,</td>
</tr>
<tr>
<td></td>
<td>T and S</td>
<td>Preference for clear instructions on navigation and e-activities (Jayatilleke, Kulasekara, Kumarasinha and Gunawardena, 2017) In line with technology affordances of mobile learning</td>
</tr>
<tr>
<td></td>
<td>P and C</td>
<td>Preference for clear instructions on navigation and e-activities (Jayatilleke, Kulasekara, Kumarasinha and Gunawardena, 2017) In line with technology affordances of mobile learning</td>
</tr>
<tr>
<td></td>
<td>P, T, C and S</td>
<td>Preference for clear instructions on navigation and e-activities (Jayatilleke, Kulasekara, Kumarasinha and Gunawardena, 2017) In line with technology affordances of mobile learning</td>
</tr>
</tbody>
</table>

Table III: Categories of instructional design and pedagogical/technological/contextual/social interaction attributes of the designed mobile application with supported research evidence.
<table>
<thead>
<tr>
<th>Categories of instructional design</th>
<th>Pedagogical (P)/Technological (T)/Contextual (C)/Social interaction (S) attributes</th>
<th>Research evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>video, etc.) and additional visual icons to the suit the mobile application (Menu, Notes, Images, etc.) to help in navigation (Figure 5)</td>
<td>P, C and S</td>
<td>In line with Paivio’s dual coding theory to present information in both text and images to facilitate the process of reading text and graphics at the same time (Clark and Paivio, 1991)</td>
</tr>
<tr>
<td>In certain instances, labels were used to enhance the meaning of icons after the feedback of user testing with novice users (e.g. word “Menu” was added to the Menu icon and word “Note” was added to the Note icon)</td>
<td>T</td>
<td>In line with Keller’s ARCS theory of motivation to get and retain the interest (attention, relevance, confidence and satisfaction) – Keller (2009)</td>
</tr>
<tr>
<td>Color scheme based on the university and faculty colors to distinguish study programs</td>
<td></td>
<td>In line with technology affordances of mobile learning</td>
</tr>
<tr>
<td>Interaction design</td>
<td>Diverse interactive activities for self-assessment (fill in the blanks, matching by dragging answers, tapping the correct answer, etc.) Providing teacher feedback for comparison</td>
<td>P</td>
</tr>
<tr>
<td>Activities enabling several attempts to facilitate learning</td>
<td>P, C, S and T</td>
<td>In line with Keller’s ARCS theory of motivation to get and retain the interest (attention, relevance, confidence and satisfaction)</td>
</tr>
<tr>
<td>Multimode activities (video) to retain the interest (Figure 6)</td>
<td>P, C, T and S</td>
<td>In line with technology affordances of mobile learning</td>
</tr>
<tr>
<td>Hypertext links to images for clarity</td>
<td>P, T, S</td>
<td>In line with Keller’s ARCS theory of motivation to get and retain the interest (attention, relevance, confidence and satisfaction)</td>
</tr>
<tr>
<td>3D views to illustrate different profiles of the visual objects (e.g. lateral/frontal view of human skull)</td>
<td>P, T, S, C</td>
<td>In line with technology affordances of mobile learning</td>
</tr>
<tr>
<td>Animated images to explain processes for clarity (e.g. life cycle)</td>
<td>P, T, S, C</td>
<td>In line with technology affordances of mobile learning</td>
</tr>
<tr>
<td>Adaptive technologies</td>
<td>Selection options for font sizes (size 1, size 2, size 3) – (Figure 7) Images with zooming facility (display technology) Hypertext links to the glossary Notepad for making notes Option of highlighting the text while reading Auto generate reports on the notes and performance Option of copying and pasting the contents into the notepad or to any other document Option of sharing content with peers when connected to the internet option of printing Notes and Reports via e-mail</td>
<td>P, T, C and S T and S T and S T and S T and S T</td>
</tr>
</tbody>
</table>

Table III.
(male) were the members of the research and development team from the inception of the research project.

Purposeful sample was used to select the subjects as novice users where they have not followed these courses before to test this innovative mobile application. All the novice users were graduates in different disciplines (BSc in Natural Science −3, BSc in Information Technology −2 and BA in Social Science −1) consisting of four females and two males.

**Notes:**
- (a) Initial instruction; (b) How to enlarge an image; (c) How to adjust the size of the image

**Figure 4.** Animated Instructions proving study guidance on how to use the mobile device

**Figure 5.** Program control, learner control and specific icons
representing age range of 25–35 years. All of them have smartphones and comfortable of using tablet computers.

4.3.2 Gathering and analyzing data to answer research questions. The second and third phases were carried out simultaneously with regular meetings with the developer and other stakeholders through testing of the mobile application. In these meetings, the application was evaluated by five groups of stakeholders: content experts to validate the content, educational technologists to check the alignment of technical and pedagogical features,
novice users to check the overall effectiveness of the application for learning purposes, developer to develop the application, modify it with the feedback and check the ease of usage and researchers to identify the impact of this innovation.

Novice users were briefed about the purpose and asked them to go through the mobile application. The lead researcher observed and made notes using observational sheets while users were explored the mobile application. At the end of the product evaluation, researcher asked questions using a structured interview schedule about their perceptions of this mobile application, their likes, dislikes, challenges and suggestions for improvement. These viewpoints were categorized using content analysis to identify the major themes.

The entire development of the application was through eight iterations where feedback from different stakeholders at different stages was integrated to the OUSL MLearn system. First iteration was to develop the initial prototype for a session. Then three iterations were focused to develop the framework to design the entire system architecture for the entire university, considering faculty, departments and program requirements. Last four iterations were testing the developed prototype with additional requirements, adding pedagogical features along with the interactive features to the course structure and testing with novice users and content developers.

4.3.3 Drawing conclusions and determining research findings. At the end of the formative evaluation, conclusions were drawn based on the findings. All the stakeholders perceived benefits of the mobile application as an effective tool for learning. Many challenges were expressed by different stakeholders and will be discussed in the results and discussion section.

4.4 Fourth phase – documentation and reflection

This is very important phase in design-based research. Unless documentation and reflection, the generation of design principles and guidelines could not be constructed and the purpose of using design-based research is not fully achieved. Ma and Harmon (2009) recommended to provide two sets of principles based on the research study. One set of principles for the practitioners on the research findings specifically related to the instructional innovation/solution/product to improve their practices. The other set of principles for researchers who are interested in conducting design-based research on how to conduct design-based research based on the reflections on the research methodology.

In this current study, reflections were part of the whole process and not only restricted to the documentation phase. Researchers reflected the research processes in all phases from phases 2 to 4 and went back and forth while documenting the process in order to generate principles. At the end of each development phase, the results were re-examined, reflected upon and used for further enrichment, producing a continuous cycle of design-reflection-design. So, formative evaluation was integrated in the testing phase of the design-based research and the results were used to improve the system to make the instruction more effective and efficient. In this study, phases 2, 3 and 4 were all connected and could not be separated as distinct phases.

The current interface of mobile application and its functionalities are the result of revisions based on the suggestions/reflections during the formative evaluation of all three phases.

4.4.1 Synthesizing design principles for developing the proposed solution (mobile application). Having gone through the reflections, the researchers felt the design-based research is very appropriate in designing and developing technology based innovations as user testing is part of the development process. Since both researchers and practitioners were involved from the beginning, their contributions were very useful in conceptualizing the solution within a theoretical framework. The following design principles were derived from the findings of the research study for mobile application.
Principle 1. Research team should have open discussions with all the stakeholders including the developer so that diverse strategies/solutions will emerge as a result. Team can discuss these strategies and identify best solutions in order to reduce the development time of the innovation.

Principle 2. Research team should consider the existing research and practices in the local context in order to develop cultural sensitive solutions as learning is contextual and situated. Some of the research studies conducted in western world may not directly applicable to eastern cultures. This study was influenced by the research findings of earlier studies conducted at the OUSL with three groups of culturally diverse groups of learners (Sri Lankans, Pakistanis and Mauritians), where they interact via learning management system for seven weeks (Jayatilleke and Gunawardena, 2016; Jayatilleke, Kulasekara, Kumarasinha and Gunawardena, 2017).

Principle 3. Instructions should be integrated in the mobile application as animated learning objects considering the user needs; especially, if the application is designed for open and distance learners.

Principle 4. When developing mobile solutions, alternative technological strategies and adaptive technologies should be designed in order to accommodate diverse learners.

Principle 5. Adaptive technologies should also be integrated in the mobile application to accommodate differently abled learners to empower them while making them more inclusive in the mainstream education.

Principle 6. Institutional leadership for direction, guidance and providing mechanism for establishing support structures are crucial in order for the sustenance and adoption of innovative mobile solution. Otherwise, diffusion of innovations will be observed only at the individual level and gradually die down.

4.4.2 Synthesizing guidance for conducting design-based research. This study adapted the model proposed by Ma and Harmon (2009) and was also influenced by the research of Keskin and Kuzu (2015). The detailed development and research procedure in the Ma and Harmon’s (2009) model was very useful in designing the procedure to conduct design-based research. However, researchers of the current study had to modify the order of certain guidelines to suit the context and the user needs. Even Ma and Harmon (2009, p. 90) stated that researchers may examine their own context to make appropriate modifications to their model. Hence, following guiding principles are proposed for the researchers who are interested in conducting design-based research based on the reflections of this research and development team.

Principle 1. Identifying the purpose and research questions for a development iteration are very crucial in the design-based research as they provide the focus for the study. Thus, they should be included in the first phase of the research study – analysis of a practical problem (refer Section 4.1.3).

Principle 2. Identifying the importance of research at the beginning of the development of innovation of project upfront and decision should be taken to integrate research while developing solutions at the beginning prior to the development of the solution and give fullest attention to the research methodology along with the development phases of the solution.

Principle 3. Educational technologist should be included as a researcher in the design-based research team to provide guidance, direction and to facilitate theory-driven research process and thereby enabling theory-building outcomes of the innovation in an effective manner.

5. Results and discussion
The views expressed by the novel users indicated that the developed mobile application was generally efficient, simple to learn, easy to navigate, appealing and engaging. It was also pedagogically constructive as the content and the tools used in the application were useful from the perspective of both the content experts and the educational technologists.
Thus, accomplishing the primary goal of this research study by providing effective instruction through mobile learning. It was also found that the developed mobile learning system was appropriate to the overall purpose of the university, could be served as a mobile learning system for the entire university and also could be used as an academic support system for the OUSL from the perspective of the developer.

Having gone through the reflection process and analyzing the qualitative data obtained by all the stakeholders using various tools, the challenges in implementing the MLearn for the entire university were identified using content analysis of the data. The categorized themes are illustrated in Table IV.

### Table IV. Factors identified through the reflections by all stakeholders in implementing the OUSL MLearn

<table>
<thead>
<tr>
<th>Factor</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time factor</td>
<td>Long development time to transform all sessions in the existing course materials into mobile learning</td>
</tr>
<tr>
<td></td>
<td>Considerable time needed for carrying out usability testing and modifying errors</td>
</tr>
<tr>
<td>Cost factor</td>
<td>High development costs for developing and implementing mobile system for the entire university</td>
</tr>
<tr>
<td></td>
<td>High initial costs for providing mobile devices for all learners unlike in permitting learners to use personal computers across diverse platforms. However, less recurrent costs by the institution for trouble shooting and customization of mobile devices or providing an alternative solution to provide financial assistance for students to purchase/use personal mobile devices. However, high recurrent costs for customizing mobile devices across diverse platforms and providing technical assistance to large number of students</td>
</tr>
<tr>
<td>Technical factor</td>
<td>Needs optimization of the mobile application based on the performance of each mobile device to enhance the visual performance</td>
</tr>
<tr>
<td></td>
<td>Screen resolution</td>
</tr>
<tr>
<td></td>
<td>Design navigation</td>
</tr>
<tr>
<td></td>
<td>Sequence of the content and activities</td>
</tr>
<tr>
<td></td>
<td>Create user interactions through the interface</td>
</tr>
<tr>
<td></td>
<td>Develop interactive activities on the touch screen (e.g. drag and drop activities)</td>
</tr>
<tr>
<td></td>
<td>Use the device both vertically and horizontally</td>
</tr>
<tr>
<td>Teaching factor</td>
<td>Lack of staff time for academics for transformation of the content for mobile applications</td>
</tr>
<tr>
<td></td>
<td>Lack of familiarity of the mobile devices by teachers to use in teaching</td>
</tr>
<tr>
<td></td>
<td>Limited knowledge in designing interactive activities</td>
</tr>
<tr>
<td>Learner support</td>
<td>Needs induction training for students to use of mobile technologies</td>
</tr>
<tr>
<td>factor</td>
<td>Needs technical support throughout the learning process through a dedicated center to address technical issues on the spot</td>
</tr>
<tr>
<td>Organizational</td>
<td>Inadequate technological infrastructure to support the requirements of the entire university</td>
</tr>
<tr>
<td>factor</td>
<td>Limited availability of mobile devices to staff and students to experiment with innovative mobile practices</td>
</tr>
<tr>
<td></td>
<td>Scarcity of seed funding allocation for innovative educational practices</td>
</tr>
<tr>
<td></td>
<td>Scarcity of support structures for the inventors to experiment novel ideas</td>
</tr>
<tr>
<td></td>
<td>Lack of structures for sustenance of the technological interventions</td>
</tr>
<tr>
<td></td>
<td>Needs effective leadership to promote and sustain innovations and creativity among academics</td>
</tr>
</tbody>
</table>

6. Conclusion and future direction

Having gone through this process, it was felt that the design-based research build on the principles of stakeholder centredness was effective in developing mobile learning application. This was due to the fact that the researchers and the practitioners were actively involved throughout the whole process and supported each other to produce an effective mobile application. The framework used in this study embeded the evaluation and testing of the solution phase (Phase 3) within the development of the solution phase (Phase 2) as these
two phases are interconnected and run concurrently. Owing to the iterative cycles of the design-based research enabled the development of an effective mobile solution through several refinements based on existing research and practices.

Cowling and Birt (2018) also showed how the process of incremental reflection and refinement of the design-based research enabled the development of a mixed reality simulation to improve skills for students studying paramedic science at a distance. The findings of the evaluation of the mobile application showed challenges with respect to development time, high production costs, technical and organizational issues, workload of academics and necessity of providing technical support both to remote students and faculty. Therefore, establishing adequate support structures for both teachers and students are essential for the sustenance of these innovative practices. This finding is in line with Montreux et al.’s (2015, p. 10) study where they also emphasized the importance of technical and pedagogical support to “stimulate teacher and student recognition of tablet devices’ potential in education.”

This application will be further evaluated through summative evaluation with actual students to assess the effectiveness of the mobile learning system to complete the design of the system fully. The design and development of any instructional material depend on the target audience, the subject content and the organizational culture of the institution (context). As such, the findings of this study may not have a universal value; however, these findings may throw light on some of the pedagogical, technological, social interaction and contextual attributes including cultural dimensions that have to considered when designing mobile applications. It also provides guiding principles for designing both mobile solutions and on how to conduct design-based research in mobile learning.

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Rethinking the rationale of open and distance education: a case of the UK Open University

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Abstract
Purpose – The purpose of this paper is to describe how the introduction of new technologies has affected student support at the United Kingdom Open University (UKOU) particularly focusing on face-to-face tutorials and online tutorials, what this impact implies for open universities and in what direction the innovations toward the sustainability of open universities should proceed.
Design/methodology/approach – Research on the historical development of UKOU and a literature review was conducted.
Findings – The rationale behind the foundation of UKOU has been to provide higher education to those who have time and physical constraints. There is no doubt that the introduction of advanced technologies has played a significant role in the growth of the university. However, when the university attempted to replace face-to-face tutorials with online tutorials on the basis of its purpose, a number of students and faculty members opposed the decision even though online tutorials fit within its original objective. This paper suggests that face-to-face tutorials have become the essence of the university through the process of identifying the university in the past and the university’s identity may need to be distinguished from the rationale.
Originality/value – This paper emphasizes the necessity of rethinking the Open and Distance Education rationale and, on the basis of past studies on UKOU, offers a unique perspective about the changes that have taken place at the university.

Keywords Open university, Human dimension, Face-to-face tutorial, Online tutorial, Open and distance education rationale

Paper type Research paper

1. Introduction
One of the objectives for Open and Distance Education (ODE) has been to provide learners with an opportunity to study regardless of geographical, socio-economic or other constraints, (Moore and Tait, 2002, p. 22), that is, to provide openness with respect to teaching and learning to all potential students. Open universities all over the world are representative ODE institutions and are based on this specific objective. The United Kingdom Open University (UKOU), inter alia, is an ODE institution and is representative of those universities. Since its establishment in 1969, UKOU has contributed to the widening of opportunities in higher education in the UK through the introduction of various technologies in its teaching. Fifty years after being founded, UKOU is now introducing Information and Communication Technology (ICT) to change with the times, a move which is consistent with the ODE rationale and should guarantee more flexible and cost-effective learning. Zimmerman (2016), the secretary of UKOU, described this change as a transition from “a university of the air” to “a
university of the cloud.” The former can be interpreted as the university of the past, while the latter can be interpreted as the university of the future. Namely, if “the air” stands for broadcasting that requires students to “attend” at airtime, “the cloud” signifies a network system that contains a vast amount of information and is accessible anytime and anywhere. It is obvious that “a university of the cloud” is more likely to make its objective a reality. Nevertheless, when UKOU attempted to replace face-to-face tutorials with online tutorials, concerns arose with respect to this change.

Through a study on UKOU, this paper describes how the introduction of new technologies have affected student support at UKOU specifically, what this impact implies for open universities more generally and in what direction innovations toward the sustainability of open universities should proceed.

2. Technologies and openness

In the 1960s, Harold Wilson, the then Prime Minister, considered radio and TV as a powerful medium of communication, which was too precious to be used solely for entertainment (Daniel, 1995, p. 11). This thought led to the establishment of a new kind of university in 1969, in which students did not have to go to the university and could instead learn at home through radio and TV: UKOU. Although most of the teaching and learning at UKOU were supposed to be done remotely, the creation of a regional structure was considered to maintain direct contact with students (Perry, 1977, p. 44). Consequently, regional offices were set up all over the country from the very beginning. These offices have the function of managing Associate Lecturers (ALs), who are charge of teaching students in tutorial classes, assessing their work and providing feedback, securing venues for tutorials and supporting student learning via the phone or (in more recent decades) e-mail. In 2014, the number of regional offices was 13, and then decreased to 6 in 2018.

The introduction of new technologies has given rise to fundamental changes in the educational system including teaching and learning activities in OU. The media used in ODE can be divided into correspondence tuition, the mass media, personal media, telecommunications and the knowledge media (Daniel, 1995, p. 10). Among these, the mass media, such as radio and TV, is what enabled the establishment of UKOU. However, there were some disadvantages to the mass media as broadcast time was fixed and students were required to “attend” classes at a specific hour. From the 1970s to the mid-1990s, personal media, such as audio or video cassettes, and personal computers, were introduced. These media allowed students to be free from time and physical constraints.Telecommunications, such as telephone and fax, also started to be used for tuition. Then, from the 1990s until today, UKOU introduced the knowledge media, which indicates a combination of telecommunications, television and computing (Daniel, 1995, pp. 116-120). Daniel, the Vice-Chancellor in 1990s, especially took notice of the use of personal computers with internet access. He predicted that by 2004, 95 percent of the students would have internet access (Daniel, 1996a). With the development of the media over the decades, UKOU has continued to grow. In 1971, when the first students were admitted to UKOU, student enrollment was 25,000, which increased to about 70,000 in 1985 and to 150,000 in 1995. The growth continued until 2010, when numbers peaked at 210,000.

The introduction of new technologies has also had an effect on cost-effectiveness (Daniel, 1996a; Bell et al., 2017, p. 99). Following the Second World War, the Conservative Party handed over the reins of power to the Labour Party. Then, the Labour Party promoted several policies in the context of social democracy, such as industrial nationalization and the establishment of the National Health Service. In the same vein, the idea of UKOU was suggested. Unfortunately, only a year after the university was established, the Conservative Party came back into power. Because the foundation of the university was an unwelcome decision for the Conservative Party, which conformed to economic liberalism, the university faced a risk of being shut down. However, when the party attempted to close UKOU, Margaret Thatcher, the then Educational Secretary, ironically insisted on saving UKOU.
against her party members’ wishes. The reason was that she found the university cost-effective (Daniel, 1996b, p. 70; Weinbren, 2015, p. 12). This historical background describes that one of the significances of UKOU was closely related to its cost-effectiveness, a feature that is connected to the introduction of new technologies.

The teaching and learning at UKOU is becoming more flexible and cost-effective these days. Since 2014, UKOU has gradually introduced the so-called Group Tuition Policy (GTP). Under this policy, the dozens of students that take the same module and the several ALs in charge of that class form a group, the so-called Cluster. One characteristic of the “Cluster” is that it does not take into account students’ places of residence. Previously, students participated in face-to-face tutorials based on their place of residence and ALs were equally assigned on the basis of location. Therefore, there was no concept behind students and ALs being artificially grouped into a “Cluster,” with students and ALs naturally forming a learning community. On the other hand, since the “Cluster” does not take the place of residence into account, it is difficult for students living in different and more distant regions to participate in face-to-face tutorials. Thus, building a learning community based on the place of residence also has been challenging. Along with this change, in November 2015, the council of UKOU decided to close seven of its regional offices, mainly in England, because the introduction of the GTP reduced the number of residence-based face-to-face tutorials and the rationale for having regional offices was essentially eliminated. As UKOU’s branch of the University and College Union tried to advocate for a vote of no confidence with regard to the Vice-Chancellor (resigned on April 13, 2018), the GTP is predicted to be canceled in the future. However, the closure of regional offices already took effect in February 2017 and the number of face-to-face tutorials also continued to decrease meanwhile.

These changes in part have to do with cost-cutting. Since the academic year 2011–2012, the UK government’s subsidy for higher education has dropped dramatically, and tuition fees for British universities have increased three- or fourfold. The rise in tuition fees has particularly affected the number of part-time students, which has fallen by approximately 300,000 people in a period of four years since 2011–2012 (Higher Education Statistics Agency, 2016). With the respect to UKOU, 75 percent of all students were part-timers, meaning that the university suffered a heavy blow. Prior to the tuition fee rise, student enrollment in 2010–2011 stood at about 210,000. As of 2014–2015, the number decreased to 140,000 students, dropping by 33 percent. As a consequence, the ODE institution ran a deficit of £16.9m and £10.5m in 2013–2014 and 2014–2015 (Swain, 2015), respectively. In such a situation, it seems appropriate to rethink on the cost-effectiveness of face-to-face tutorials. To keep offering tutorials, it is necessary to pay the rent for the regional offices and venues, as well as the salaries of the staff involved.

In spite of that, the decision regarding reducing the number of face-to-face tutorials is likely to be natural. The concept of telecommunication has existed since the past and there have been discussions about replacements (Lammie, 1975; Matthews, 1999; Randle, 1999), but they were not enough to completely eliminate face-to-face sessions for many reasons, including the slow communication speed for synchronized online conferencing. Nowadays, with the development of ICT, this particular problem has been resolved almost completely. Unless the whole reason is related to the financial state of the university, it was natural for UKOU to make such a decision, which allowed them to be more “open,” substantializing the ODE rationale more effectively and providing students with an opportunity to study regardless of geographical, socio-economic or other constraints. However, the change would be more appropriate for an online learning environment and, therefore, has faced opposition from students, who prefer a “less open” environment for learning.

3. Tutorials and openness
Even though face-to-face tutorials have existed from when UKOU first launched, it is no exaggeration to say that the tutorials have been at risk throughout the entire history of
the university. Reductions of face-to-face tutorials have occurred at least four times, including the current one.

Evidence for the first reduction is found in an article entitled “Why there is no future for face to face tuition,” which was published in UKOU newspaper Sesame in 1975 (Lammie, 1975). As the number of courses had increased from 76 to 145, the average student population for each course decreased. Also, the sites where tutorials were held were spread out all over the country. Inevitably, travel distances especially for tutors increased, so it became difficult to maintain the number of face-to-face tutorials. Besides, the huge difference in enrollment numbers in popular courses and less popular ones was another problem.

In 1984, the number of face-to-face tutorials was reduced due to financial reasons. Margaret Thatcher, by then the Prime Minister, demanded great accountability from universities and cut off government grants for institutions of higher education. At that time, the level of dependence of universities on governmental grants was 80–90 percent, greatly influencing universities including UKOU. Specifically, 76 percent of UKOU students attended more than one tutorial and 80 percent of those who passed their course(s) did so. (Student Research Centre, 1986, p. 16). The impact of the reduction may thus have been huge. In addition, the possibility that the reduction of tutorials offered affects student retention was suggested for the first time. Perry (Taylor, 1980) argued to insist that tutorial cut-backs are likely to result in an increased drop-out rate from foundation courses, with Perry writing in his work OU a personal account by the first Vice-Chancellor that “the class tutorials undoubtedly played a part in the success rate by diminishing the drop-out from foundation course” (p. 113).

Although face-to-face tutorial had seen cut-backs several times, these cuts were basically always in terms of the frequency of the tutorials offered. The thought that face-to-face tutorials could be replaced with something else entirely never occurred in those days, even when they were supplemented with different kinds of student support. It concerned the burden caused by long-distance travel for tutors and students, and not the elimination of the face-to-face tutorials (Lammie, 1975). Also, the Student Research Centre was not able to suggest any other method to replace face-to-face tutorials, even though utilizing more letters and telephone counseling to facilitate students’ learning was advised. That is to say, the term “face-to-face tutorial” was considered equivalent with “tutorial” or “tuition.”

In 1999, only a few years after the introduction of the internet, the then Vice-Chancellor of the university, suggested the possibility of replacing face-to-face tutorials with online ones. However, articles published in Sesame, such as Matthews’s “Fears that face-to-face tuition may suffer from move to computers,” indicate that students were worried rather than excited about the possible change (Matthews, 1999). It was the first time that face-to-face tutorials were compared with another method of tutorials. One student’s view about the pending change, expressed in UKOU newspaper was as follows:

I value tutorial support very highly. To me it is the most important thing in UKOU after the quality of the written material. At its best (and most of my tutors have been very good) a tutorial provides clarification of tricky points in the course, revision and often new slants on the material which adds intellectual excitement. At second and third level tutorials are already very few – just four for several of the courses I have done. On-line support would be no substitute and would be welcome only in addition to the existing provision. I would welcome the ability to e-mail my tutor, both out of consideration for him/her and to enable me to express my query clearly. I would also support the recommendations in the report (Sesame, 192). I write this in my 6th UKOU year and in proud possession of a computer (and therefore not a Luddite). (Fielden, 1999)

As indicated at the end of the quote, this student was neither a novice user of technology nor unconditionally opposed a new-type tutorial. Nevertheless, the student’s perception toward online tutorials appears to be as a sort of supplementary lesson. This view was not merely a
minority opinion. The then Pro-Vice Chancellor Diana Laurillard was quoted as saying, “[W]henever students are asked which teaching methods they would like more of, face-to-face tutorials always appear at the top of the list” (Matthews, 1999). New technologies, such as personal computers and the internet, were not popularized enough. According to an investigation of UKOU, only 39 percent of students had access to a computer or the internet and students that were older than 44 and female students turned out to be less convinced about the change, leaving the distinct possibility that particularly these students would likely feel alienated (as cited in Matthews, 1999). In addition, the investigation that most students did not only own a computer but have access to the internet may mean students’ digital literacy was remarkably lower than those of today. The situation is different now. In 2014, the year that UKOU initiated the GTP, the penetration rate of computers in the UK had reached 85 percent, compared to 32 percent in 1999 (Statista, 2018b). The penetration rate of internet access had grown to 91.6 percent (Statista, 2018c). Internet speed had drastically increased by about 535 times (Ofcom, 2015, p. 9; Statista, 2018a), allowing students to communicate with tutors and other students at a much greater ease even through video conferencing with high-quality video and audio. Furthermore, the ownership rate of mobile computing devices such as smartphones and tablet PCs has marked a steep growth over recent years (Ofcom, 2017, p. 10). Based on these data, it can be inferred that students’ perceptions of online tutorials have become more positive. The decision for the latest reduction was made in this status quo.

However, there have been constant debates about changes within and outside the university. The University College Union conducted a signature-seeking campaign against the closure of the regional offices, which involved approximately 7,000 people (confirmed on April 19, 2016, now closed). Mass media, including the BBC, the Guardian and Times Higher Education, also provided thorough coverage of the changes, possibly because they were related to labor issues. For example, approximately 500 staff lost their employment because of the shutdown of regional offices (Sellgren, 2015). The redundancies included employees that had played an essential role in offering face-to-face tutorials, such as AL Services staff (mainly responsible for securing venues for face-to-face tutorials) and Staff Tutors (responsible for managing ALs). Moreover, there was one more consequence effected by the change. It also constituted a change of the form of the university. In an interview, Tony Coughlan, a tutor who worked at the Bristol Regional Office, described the change as follows:

There was an excitement and sense of being part of a learning community. It was thrilling and really motivating. You don’t get that so much online. There is a sense when you are part of a community that you aren’t alone. If you are feeling a bit wobbly and thinking of throwing in the towel, you see lots of other people in the same position and it helps you carry on. (Swain, 2015)

Coughlan found that when students felt a sense of being a part of a learning community, it resulted in motivating and sustaining their learning. In his opinion, this sense could be obtained from a learning environment that allowed students to meet face-to-face more so than online. Technology has played an important role in realizing the ethos of ODE. By introducing new technologies, students could enjoy the benefits of a more flexible learning environment and lower tuition fees, which stayed at the same level or at least increased more slowly than fees at regular universities. However, Coughlan questioned whether the quality of learning would be the same. For him, the most developed technology in ODE could create a gap between an ideal and a learning effect when trying to replace the face-to-face learning environment.

A survey of students’ attitudes about face-to-face tutorials and online tutorials was conducted, targeting students who had studied in a range of undergraduate modules held in October 2012, excluding language courses, in which the requirement for synchronous voice
interaction is specialized (Goodfellow, 2014). Of the number of students contacted, 626 of 3,910 responded. As the number of respondents is small compared with the number of students enrolled at the university, generalizing the results is difficult. However, Goodfellow (2014) may be worth citing as it is among the few publicly available surveys on students’ attitudes toward tutorials in UKOU. One of the key findings is as follow:

More students agreed with the other proposed benefits of face-to-face tutorials than agreed with the other proposed benefits of online tutorials. There are indications that online tutorials are not perceived to deliver the benefits of engagement in discussion about course topics, understanding how to get good marks in TMAs, getting to know other students, and encouragement to keep going, to the same degree that face-to-face tutorials do. (Goodfellow, 2014)

The above quote describes that more students still expect and feel that face-to-face tutorials are more advantageous to them. In addition, other elements like “getting to know other students” or “encouragement to keep going” seem to underpin what Coughlan argued. However, it should be noted that most students, as Goodfellow also observed, found online tutorials also helpful as much as face-to-face tutorials are – the difference is not seen as considerable (86 percent vs 92 percent). Also, it turned out that there were still a few students who could not attend any of face-to-face tutorials due to lack of time, tutorial schedule and its location. The percentage of these students were 11, 9 and 13 percent (duplicates allowed). What is certain is that the provision of online tutorials appeals to students who cannot afford to attend face-to-face tutorials and students who are still unable to attend those tutorials because of geographical and time constraints are not few in number. In this respect, online tutorials appear to be OU like, based on the ODE rationale.

4. “A real university” and openness

The question of whether UKOU is “a real university” seems to have been asked frequently. Keegan and Rumble (1982, pp. 246-247) determined that the university is recognized as a genuine university on the following grounds: credit transfer between the university and conventional universities is available and the chief executive officer of UKOU is a member of the national committee of the head of universities in the country. However, UKOU underwent a process to identify itself as a new type of university that had never existed before. In 1986, the Student Research Centre attempted to demonstrate the importance of face-to-face tutorials in terms of the human dimension, i.e. students being directly in touch with the university, or making personal contact with its staff and other students and not feeling alienated from the university. One of the reasons why the human dimension was regarded as important was to convince people that even a different, new kind of university was equal to conventional ones. In the 1960s, higher education was still the exclusive realm of the elite and had only just started to be become more popular. When UKOU was founded, there was no university that utilized the same teaching methods and/or accepted students without any requirements in the way that UKOU did. These features became a target of criticism as the validity of the establishment was questioned (Brittain, 1969; Rumble and Keegan, 1982, p. 216), requiring UKOU to demonstrate that, though being a novel type of university, it was nevertheless equal to “real universities.”

One of representative examples that reveals the efforts made was the decision to adopt the regalia and ceremonials of existing universities in spite of opposition from those who believed these trappings should be swept away (Perry, 1977, p. 47). However, as for the educational process, UKOU could not copy any of the existing universities as its own teaching methods and students’ learning processes constituted an experiment distinct from what all other academic institutions were doing. The OU had to find its own way to be “a real university.” As a result, researchers on UKOU concluded that “students’ sense of being a member of ‘a real university’ (not a correspondence college), which makes personal contact
with them in a variety of ways, is not just an enjoyable by-product of the educational process but intrinsic to it” (Student Research Centre 1986, p. 14). Face-to-face tutorials and summer schools can be cited as examples for achieving this, as they offered, in addition to their educational purposes, an experience of learning at “a real university” to students. Perry (1977, p. 117) argued that the subject matter studied during a summer school does not necessarily need to be directly related to and be integrated with the subject material of the rest of the course taken but that students’ physical presence is most important. Providing face-to-face tutorials had not been planned from the beginning. The university found that hiring high-quality tutors in all regions was possible and then changed its policy to offer such tutorials over and above correspondence tuition as a form of remedial education (Perry 1977, p. 112). Perry described the change as follows:

Thus the very size of the foundation [tutorial] classes was allowed to erode the principle of relying solely upon teaching at a distance. It was erosion that was welcomed by students and part-time staff alike, and by a large number of the full-time academic staff. (p. 113)

It is worth noting that the change ended up highlighting the significance of physical presence even though the university was established as a higher education institution with precisely the opposite premise: distance learning. This dual-mode structure can be seen as the result of the compromise with “a real university.” The process of establishing the structure is not merely to imitate traditional universities, but a way to identify a new type of university in itself.

Nowadays most forms of student support, including tutorials, have become technically possible and the old system is now being replaced. As Goodfellow (2014) noted, both types of tutorials had high satisfaction rating from students. However, there was the only consideration on how to be more “open,” while the consideration on what identifies a university has been insufficient. Students and faculty members of UKOU not welcoming the replacement of face-to-face tutorials with online tutorials, as described in earlier literature (Lammie, 1975; Fielden, 1999; Matthews, 1999; Randle, 1999; Swain, 2015) may be a signal of opposition to the change of the nature of UKOU. Kerr (2001) suggested that there have been three different types of universities in history so far: the academic cloister (e.g. University of Oxford), the research organism (e.g. University of Berlin), and the city of intellect (e.g. University of California). None of those types are defined as a university teaching and recruiting students the same way as UKOU. In addition, Fallis (2007, p. 219) insisted that the university has always been a “place.” That is, the physical presence of an academic institution has historically been the inherent essence of what constitutes a university. It is important to note that none of these qualities are in inadequate to illustrate what UKOU is. The process of defining what the university is still in progress.

5. Conclusion

Today, high-speed internet and high-performance network devices such as computers, smartphones and tablet PCs, are used widely. Considering this fact, introducing more online tutorials and diminishing face-to-face tutorials is likely to be effective in terms of realizing the ODE rationale behind. Furthermore, technological advances could also help improve its financial status through the growth of the number of students. Online tutorials have more advantages for realizing the objective of UKOU. According to a study on students’ attitude toward face-to-face tutorials and online tutorials, the satisfaction ratings were almost the same for both (86 vs 92 percent). From this perspective, it can be argued that the reduction of face-to-face tutorials contributes to the essential mission of the university. However, when UKOU decided to introduce more online tutorials and thus reduce the number of face-to-face tutorials, those opposed to the change argued that face-to-face tutorials provide an important sense of being part of a learning community. In other words, students and tutors are worried about UKOU becoming a “university of the cloud.” This means that the issue
requires a consideration from a different point of view, rather than considering it as merely a controversy over face-to-face vs online. The introduction of face-to-face tutorials was not originally planned. It only came about when UKOU found that hiring high-quality tutors in all regions was possible and then adopted those as remedial education. Later, the university found that direct contact with students, such as through face-to-face tutorials, constituted one of the most important methods to strengthen human connections to give students a sense of being a member of a "real university." Ultimately, the university introduced a dual-mode system, going against the original ODE rationale, and this system transformed into what UKOU is now. This system also forms a fundamental idea of open universities. This can be seen as a process of creating the identity of a new type of university. The question which is posed by the current issue between face-to-face vs online is not only about comparing the effectiveness between two modes of education, but also about how open universities define themselves going forward.

Raggatt (1993) was concerned about UKOU having to compete with an increasing number of universities that utilize distance education modes. Indeed, the ODE market is no longer unique to open universities (Garrett, 2016, p. 41; Tait, 2018, pp. 15-16). As more competitors have been emerging, e.g., in the form of Open Educational Resources, Massive Open Online Courses (MOOCs) as well as distance learning courses being now also offered at traditional universities, the long-term sustainability of open universities has been questioned. MOOCs provide a particular threat. Although students cannot obtain a full degree with these courses, they can acquire certificates, digital badges, MicroMasters and/or Nanodegrees. All of these take a comparably short time to acquire, yet give proof of their holders' specific skills, meaning they can be used advantageously for employment. Such certifications will especially appeal to those already working and seeking continuous education. Sebastian Thrun, the founder of Udacity, one of the biggest MOOC platforms, claims that due to these different educational models only ten higher education institutions will exist in 50 years' time (The Economist, 2012). The time to think what values open universities must have in order to be able to survive in the future seems to be getting closer.

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Teaching innovations in Asian higher education: perspectives of educators

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Abstract

Purpose – The purpose of this paper is to identify the teaching innovations that have been implemented in higher education institutions in Asia and the perspectives of educators on them.

Design/methodology/approach – Semi-structured interviews were conducted with 28 educators who were affiliated with 23 higher education institutions in ten Asian countries/regions. The interviews covered information about the teaching innovations of the participants’ institutions, the characteristics of the innovative practices and the participants’ views on them. The relationships between the characteristics of institutions and their teaching innovations were also examined.

Findings – The results showed that the teaching innovations included two main categories, namely, those which involved the use of advanced technologies and those which did not. The innovations that involved the use of advanced technologies were mainly from larger institutions, while the other category was mainly from smaller ones and had been practised for less than 1.5 years. Differences were also identified between the two categories in terms of the aims and importance of innovations, innovative features, the evaluation of innovations and improvements needed for them.

Originality/value – The results highlighted that technology is only one of the many aspects of teaching innovations, which is different from the view prevailing in the literature. They also suggested that differences in the scale of institutions (in terms of number of students) possibly influences the kind of teaching innovations adopted.

Keywords Innovation, Asia, Tertiary education, Technology, Teaching, Higher education institutions

Paper type Research paper

Introduction

Innovation has been regarded as the key for higher education institutions to respond to technological advances and the changes in social and cultural values (Ahmad, 2015). Educational institutions must be “change-resilient” and continuously improve their practices and methods of delivery (Weller and Anderson, 2013). In the educational context, innovation often lies in teaching, with “newness” as an essential ingredient (Hauser and Hauser, 2011). It can occur in forms such as the use of new methods and novelty in content, pedagogy or curricula (Lee, 2011; Smith, 2011; Zhu, 2013).

Teaching innovation has been understood and practised in various ways. Among them, technology is an element commonly found, and is often adopted as a support mechanism for the delivery of new teaching methods (Zhu et al., 2013). Examples include cloud-based applications and electronic whiteboards (Lee, 2011); student response systems in the classroom (Choi et al., 2018; Lantz, 2010); mobile devices for in-class and out-of-class activities (Li, Lee, Wong, Yau and Wong, 2018); and learning analytics to evaluate and improve teaching effectiveness (Wong, 2017). Zhu et al. (2013) specified technological competence as one of the four major competencies required in innovative teaching, in addition to learning, social and educational competence. In Salmon’s (2014) framework...
for learning innovation, technology is a major dimension for categorising different innovative strategies.

Asia is a continent which places a strong emphasis on innovation. The *Harvard Business Review* (2017) highlighted the top 10 countries in the Bloomberg 2017 Innovation Index, among which were three Asian countries. In the OECD’s (2014) report on measuring innovation in education for countries/regions all over the world, 80 per cent of the Asian countries/regions covered in the report got an overall rating for education innovation which was above the average in terms of the changes in educational practices. However, there has also been criticism of the cultural and social factors in Asian higher education, which may hinder new thinking and innovation (Altbach, 2010). Li, Ye and Wong (2018) found that the development of learning analytics was diverse in various higher education institutions in Asia, with some working actively on it to innovate their education delivery and some encountering difficulties because of resistance to change. The cultivation of teaching innovations in Asian higher education therefore varies widely.

This study aims to explore the teaching innovations in Asian higher education from the perspectives of educators in relevant tertiary institutions. It identifies the teaching innovations that have been implemented in Asian higher education institutions, and examines the relationships between the innovation practices and the characteristics of the institutions. Specifically, this study addresses the following research questions:

*RQ1.* What teaching innovations have been implemented in higher education institutions in Asia?

*RQ2.* What are the characteristics of those teaching innovations?

*RQ3.* What are the views of Asian tertiary educators on the teaching innovations, their future development and ways of evaluating them?

*RQ4.* What are the relationships between the characteristics of institutions and their teaching innovations?

**Literature review**

The literature relevant to teaching innovations has covered a broad range of areas, from the perceptions of teaching innovation to the factors in successful innovation practices, the specific innovations implemented in education institutions and their effectiveness.

Zhu (2013) investigated the extent of innovation in teaching and learning in the schools in two Asian cities (Beijing and Hong Kong) as perceived by their teachers and students. On the dimensions of technology, pedagogical orientation and cultural environment, they found an overall high level of technology use in the schools, but a low level of its use for collaboration and a low level of pedagogical innovation. It was concluded that the teachers and students did not perceive their schools as innovative, despite the existence of innovative elements in their teaching and learning strategies. Hofman *et al.* (2011) presented the differences between school leaders and teachers in their perceptions of hindrances to innovations. They showed that teachers regarded the factors – such as the lack of sufficient support, the lack of proper educational tools and the unfit organisational structure for the innovation – as more of a bottleneck than the school leaders did. They claimed that such kinds of bottlenecks would be more visible in institutions in developing countries with a shortage of resources and teachers.

Another category of related studies has focussed on the drivers of successful innovations. Smith (2011) identified external and institutional rewards, as well as recognition, as the key drivers of innovation in learning and teaching. Support from senior management and the availability of technical support, for both short-term and long-term projects, are also important for the sustainable development of institutional innovation. Lunde and Wilhite (1996) identified
the characteristics of teachers who are innovative, showing that passion, persistence in improvement, being attentive to students, the use of active learning, risk taking and keeping themselves vital are the key characteristics. Lee (2011) investigated how teaching innovation and the integration of information technology into teaching contribute to learning effectiveness. The results showed that both these factors had direct, positive and significant effects on students’ learning effectiveness.

The success factors for teaching innovations have also been presented in relevant frameworks. Hazen et al. (2012) proposed a framework for the dissemination of education innovations. For the target groups to adopt and routinely practise an innovation, this framework emphasises the awareness of innovation, as well as the characteristics of innovation (e.g. materials, methods, and attributes), target groups (e.g. personality and experience) and the environment (e.g. infrastructure, reward system and class size). Salmon (2014) offered a strategic framework for enhancing learning and pedagogical innovation, including two dimensions – the adoption of current/new learning design and technology, and the focus on current/new missions, markets and contexts. It was claimed that this framework facilitates the engagement of institutional members in an achievable and acceptable innovation agenda.

As far as specific innovative teaching practices are concerned, Evans et al. (2016) found that their blended curriculum in pre-clinical epidemiology and biostatistics had positive effects on both student satisfaction and their mastery of core materials. Foster and Yaoyuneyong (2016) implemented a flipped classroom in two business classes; and positive feedback was received from students, who said that they recognised the value of the process, improved their communication skills, and became better prepared for the workplace environment. Neo and Neo (2001) reported the use of multimedia technology as a teaching and learning strategy in a problem-based learning environment, and students expressed positive attitudes to the innovation in terms of enjoying the teamwork, and noted that it could enable them to think critically and be active in their participation. Drummond et al. (2016) combined video and simulation in teaching medical students, which also had a positive impact on teaching and learning. Finally, Kampylis et al. (2013) reviewed cases of ICT-enabled innovation for learning from Europe and Asia. The Asian cases include one from Hong Kong on exploring suitable modes and support measures for the development of sustainable, transferable and scalable e-learning solutions; a case in Japan on promoting student-centric education by creating a large learner community; a Singaporean case on engaging its entire school population in self-directed and collaborative learning with ICT; and a South Korean case on developing accessible and easy-to-use digital textbook contents by leveraging the potential of mobile devices and social network tools.

The relevant literature reveals the divergence of teaching innovations in Asia. In particular, technology was a major element in the innovation practices, but there were also practices which did not involve the adoption of technology. In addition, there were cases in which the use of new technology was mistaken for educational innovation (Salmon, 2014), and various stakeholder groups may have different, or even contradictory, perceptions of innovation practices (Hofman et al., 2011; Zhu, 2013). There is therefore a need for further work on this area to investigate the diverse aspects of teaching innovations in Asian higher education.

Methodology

Semi-structured interviews were conducted with a total of 28 educators working in higher education institutions in Asia, with the aim of collecting information on the innovative teaching practices in their institutions and their views on them. About 60 per cent of the interviewees were academics involved in frontline teaching, 25 per cent were in management and the remainder were IT experts, teaching and learning officers and
research support staff. The interviewees were affiliated to 23 institutions, of which 26 per cent were private and 74 per cent were publicly-funded. About 40 per cent of the institutions had more than 10,000 full-time students. All the institutions were located in Asian countries/regions, including Hong Kong, Indonesia, Japan, Mainland China, Malaysia, Pakistan, Singapore, Taiwan, Thailand and the Philippines.

The interviews had three parts, namely, factual information – aims, start date, and context of implementation – on the most recent teaching innovation in which an interviewee had been involved; the features of the innovation and its evaluation method; and the views of the interviewees on the teaching innovation in terms of its importance, difficulties encountered, possible improvements and the effectiveness of the evaluation method. The data were then coded with categories of themes identified for each question. Descriptive statistics, such as the frequency distributions and cross-tabulations, were performed to explore patterns in the findings.

Findings

The nature of innovations and their implementation

Types of innovation. The teaching innovations described by the interviewees can be categorised into two main groups – those that involved the use of technology and those that did not. Table I shows the teaching innovations involving the use of advanced technologies, most of which were internet- or mobile-oriented. The participants emphasised that real-time communication is a key advantage. MOOC and flipped classrooms, as two examples relying heavily on the internet, have become popular and have demonstrated their effectiveness in improving students’ learning performance.

Table II lists the innovations where technology was not a core part. The most frequent one was related to students’ active learning, followed by the use of videos in classroom teaching and interdisciplinary collaboration between students. A characteristic of this category of innovation is that it not only focused on students’ learning but also other aspects such as teaching and students’ feedback.

Figure 1 presents the level of the teaching innovations, more than half of which were implemented at a course level. The innovations covered a broad range of 19 disciplines, such as

<table>
<thead>
<tr>
<th>Teaching innovations</th>
<th>Freq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of online materials or software tools</td>
<td>6</td>
</tr>
<tr>
<td>Use of mobile technology</td>
<td>5</td>
</tr>
<tr>
<td>Massive open online course</td>
<td>3</td>
</tr>
<tr>
<td>Flipped classroom</td>
<td>3</td>
</tr>
<tr>
<td>Simulation</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
</tr>
</tbody>
</table>

Table I. Teaching innovations that involve advanced technologies

<table>
<thead>
<tr>
<th>Teaching innovations</th>
<th>Freq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active learning</td>
<td>3</td>
</tr>
<tr>
<td>Use of videos in classroom teaching</td>
<td>2</td>
</tr>
<tr>
<td>Interdisciplinary collaboration between students</td>
<td>2</td>
</tr>
<tr>
<td>Sharing of teaching and learning resources among teachers</td>
<td>1</td>
</tr>
<tr>
<td>Survey of student feedback</td>
<td>1</td>
</tr>
<tr>
<td>Mutual class observation among teachers</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>

Table II. Teaching innovations that did not mainly involve advanced technologies
as accounting and finance, arts and culture, computer science, economics, engineering, law, mathematics and nursing. This is consistent with the situation described in the literature, namely, that teaching innovations are often employed on a discipline-specific rather than an institution-wide scale, possibly due to disciplinary differences in study content.

Figure 2 shows the number of years that the teaching innovations had been implemented, with the average being 2.3 years. About half of the innovations had been practised for 1.5 years or less. Also, about 20 per cent had been practised for more than three years.

Aims of innovations

Table III shows the aims of the innovations as reported by the participants. The innovations which were technology-oriented put more emphasis on the cognitive and academic aspects of learning (e.g. understanding of subject knowledge and preparation for exams), as well as the facilitating conditions (e.g. students' participation in class).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase students' participation</td>
<td>7</td>
<td>7</td>
<td>Cultivate students' independent learning ability</td>
<td>2</td>
</tr>
<tr>
<td>Check students' understanding</td>
<td>6</td>
<td>6</td>
<td>Facilitate collaboration among students</td>
<td>2</td>
</tr>
<tr>
<td>Enhance teacher–student interaction</td>
<td>4</td>
<td>4</td>
<td>Prepare students for adapting to learning in the institution</td>
<td>2</td>
</tr>
<tr>
<td>Help students to solve problems</td>
<td>2</td>
<td>2</td>
<td>Provide students with better services</td>
<td>2</td>
</tr>
<tr>
<td>Prepare students for exams or the work environment</td>
<td>2</td>
<td>2</td>
<td>Support teachers' sharing of teaching materials</td>
<td>1</td>
</tr>
<tr>
<td>Increase mobility in learning</td>
<td>2</td>
<td>2</td>
<td>Develop students' creativity</td>
<td>1</td>
</tr>
<tr>
<td>Stimulate students' interests</td>
<td>1</td>
<td>1</td>
<td>Assist students in learning from their peers</td>
<td>1</td>
</tr>
<tr>
<td>Enable students to understand their own progress</td>
<td>1</td>
<td>1</td>
<td>Meet market needs</td>
<td>1</td>
</tr>
<tr>
<td>Help students to improve their English</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>Total</td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

Table III. Aims of innovations
and teacher–student interactions). The non-technology-oriented ones, on the other hand, were more related to the non-academic and non-cognitive aspects of students’ development, such as the ability for independent learning and creativity.

Features of innovations. Table IV presents the features of the innovations, where distinctive patterns were found in the two categories. The technology-oriented innovations featured the higher usability of technology and better students’ learning (e.g. learning motivation, understanding and in-class discussion), while the non-technology-oriented ones focussed on the facilitation of teaching and students’ collaboration.

Evaluation of innovations. Table V reports how the innovations were evaluated. There were no clear patterns between the two categories. The most common method for evaluating the innovations was feedback from students, such as questionnaire surveys and interviews with individual students or focus groups. This was followed by students’ academic performance, and evaluations by different stakeholders, such as teachers, management and the government. Some participants reported that no evaluation was conducted for the innovations. Also, some of them pointed out that no direct evaluation was conducted specifically for the innovations, with the evaluation being carried out together with other student experience as a whole, e.g. students’ overall evaluation of their learning experience.

Views on teaching innovation

Importance of the innovations. Table VI lists the importance of the innovations from the view of the participants. Despite the various aims and features of the innovative practices,
their importance mainly revolved around students’ learning. Student engagement was most frequently mentioned, followed by mobility in learning, independent learning ability and student–teacher interaction. There were also teacher-centred points, such as checking students’ understanding and teachers’ reflection on their teaching. The results suggest that the participants regarded students as the focus of teaching innovations.

Difficulties in implementing the innovations. Table VII presents the participants’ difficulties in implementing the innovations. Despite the difficulties related to students
(e.g. their lack of motivation and limited participation), more challenges lay in the teachers’ aspects such as their lack of required knowledge and skills and their motivation to implement the innovations. In addition, technological and management problems were frequently mentioned. The participants’ feedback thus showed a broad range of challenges to be tackled for achieving the desirable outcomes of the teaching innovations.

**Ways of improving the innovations.** Table VIII shows the participants’ views on ways to improve the innovations. Between the two categories, the technology-oriented innovations were viewed more frequently as having room for improvement in, for example, student participation, interaction and the use of technology. The non-technology-oriented ones involved, for instance, catering for students’ diversity, having suitable facilitators and learning activities, active learning, catering for the emotional needs of students, and changing students’ mindset.

**Preferred ways of evaluation.** Table IX presents the participants’ preferred ways of evaluating the innovations, which may be different from the ones in practice in their institutions. Both groups regarded student feedback, academic performance and teachers’ evaluation as the best indicators of the success of the innovations. The technology-oriented group also included indicators such as usability and students’ online records of technology use. For the non-technology-oriented group, evaluation by stakeholders including parents, management and industry representatives was pointed out.

The relationships between the teaching innovations and other factors

Table X presents the relationships between the teaching innovations and factors including the scale of institutions and the length of implementing the innovations. The institutions

<table>
<thead>
<tr>
<th>Ways to improve the innovations</th>
<th>Non-technology-oriented innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote student participation</td>
<td>Cater for students’ diversity 2</td>
</tr>
<tr>
<td>Enhance interaction (teacher–student and student–student)</td>
<td>Select suitable facilitators 2</td>
</tr>
<tr>
<td>Improve teachers’ use of technology</td>
<td>Pay more attention to learning activities 2</td>
</tr>
<tr>
<td>Reduce teachers’ workload</td>
<td>Change students’ mindset 1</td>
</tr>
<tr>
<td>Develop more multimedia materials</td>
<td>Offer rewards to students 1</td>
</tr>
<tr>
<td>Understand teachers’ needs</td>
<td>Cooperate with other institutions 1</td>
</tr>
<tr>
<td>Help students to understand better what to do</td>
<td>Promote more active learning 1</td>
</tr>
<tr>
<td>Apply the innovation in different disciplines</td>
<td>Cater for students’ emotional needs 1</td>
</tr>
<tr>
<td>Conduct more relevant research</td>
<td></td>
</tr>
<tr>
<td>Offer more funding</td>
<td></td>
</tr>
<tr>
<td>Total 24</td>
<td>Total 11</td>
</tr>
</tbody>
</table>

Table VIII. Ways of improving the innovations

<table>
<thead>
<tr>
<th>Ways of evaluation</th>
<th>Non-technology-oriented innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student feedback</td>
<td>Student feedback 4</td>
</tr>
<tr>
<td>Students’ academic performance</td>
<td>Students’ academic performance 3</td>
</tr>
<tr>
<td>Evaluation by teachers</td>
<td>Evaluation by teachers 2</td>
</tr>
<tr>
<td>Students’ products</td>
<td>Evaluation by parents 1</td>
</tr>
<tr>
<td>Students’ online records</td>
<td>Evaluation by management 1</td>
</tr>
<tr>
<td>Usability tests</td>
<td>Evaluation by industry representatives 1</td>
</tr>
<tr>
<td>Comparison (between experimental and control group)</td>
<td></td>
</tr>
<tr>
<td>Total 22</td>
<td>Total 12</td>
</tr>
</tbody>
</table>

Table IX. Preferred ways of evaluating the innovations
where the innovations were implemented were classified as “large” or “small” according to their number of students[1]. The technology-oriented innovations were mainly from larger institutions (78 per cent), possibly because they usually have more resources for implementing innovations. A relatively larger proportion (47 per cent) of this group of innovations had a longer length of implementation of more than 1.5 years. In comparison, a smaller proportion (56 per cent) of the non-technology-oriented group was from large institutions, but more were from small institutions (e.g. community colleges). The innovations of this group had been implemented mostly (80 per cent) for 1.5 years or less.

Discussion
The results of this study have unveiled the diversity of teaching innovations in some Asian higher education institutions as well as their educators’ perceptions of them. The findings also suggest that the nature of an institution, especially its scale, might shape the adoption of teaching innovations. These findings help to show the formation of innovative strategies for Asian education institutions, particularly for open and distance learning institutions with various scales and development status (Wong and Wong, 2018).

The finding that teaching innovations may have no relationship with the use of technology contrasts with some of the literature which has put the incorporation of the latest technology as the core element – or at least one of the core elements (Zhu et al., 2013) – of teaching innovations (Bruce, 1989). In this study, the results also confirm Zhu’s (2013) view that innovations in teaching and learning should not be viewed only from the perspective of the adoption and acceptance of technology. Other relevant factors for conceptualising teaching innovations also include the cultural environment (Zhu, 2013), active learning (Chung and Chow, 2004), open-ended and collaborative learning (Bocconi et al., 2014; Foster and Yaoyuneyong, 2016), the implementation of course design that inspires students to integrate knowledge with practice (Lee, 2011) and student engagement (Bildfell, 2015), in addition to the advancement of knowledge, cognitive development and improved academic performance. Lunde and Wilhite (1996) conceptualised innovative teaching as a cluster of qualities of teachers who are able to interact effectively with learners; teachers’ openness to change, being persistence, being reflective, using specific teaching approaches and using discipline-embedded pedagogy. Some of the non-technological elements, such as active learning, collaborative learning, integration of knowledge and practice, stimulation of interests and interactions between students, were mentioned by the interviewees in this study.

In some innovation practices, technology was used to enhance the non-academic aspects, such as student–teacher bonding and interaction. This phenomenon is a synthesis of the two views of the participants, who either emphasised the use of technology to enhance students’ cognitive skills and academic performance, or the development of their non-academic aspects through non-technological means. Such practices can also be found in the literature, such as the study by Neo and Neo (2001), which applied multimedia to enhance problem-solving skills and found significant improvements in their students.

The teaching innovations in the Asian education institutions did not necessarily involve the latest educational technologies. Some innovative practices made use of existing

<table>
<thead>
<tr>
<th>Factors</th>
<th>Technology-oriented innovations</th>
<th>Non-technology-oriented innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale of institution*</td>
<td>Large: 14 (78%)</td>
<td>Large: 5 (56%)</td>
</tr>
<tr>
<td></td>
<td>Small: 4 (22%)</td>
<td>Small: 4 (44%)</td>
</tr>
<tr>
<td>Length of implementation</td>
<td>≤ 1.5 years: 9 (53%)</td>
<td>≤ 1.5 years: 8 (80%)</td>
</tr>
<tr>
<td></td>
<td>&gt; 1.5 years: 8 (47%)</td>
<td>&gt; 1.5 years: 2 (20%)</td>
</tr>
</tbody>
</table>

Notes: *Large institutions: 10,000 students or above; small institution: below 10,000 students

Table X. Relationships of the teaching innovation with the scale of institutions and length of implementation
technology for new contexts in institutions, such as the flipped classroom or use of online teaching materials. This relates to Salmon’s (2014) transformative framework for learning innovation, namely, that the choices of where and how to innovate should not be based on “off-the-shelf” strategies or market-led approaches, but on meeting an institution’s mission and objectives through its core capabilities and existing strengths.

Conclusion

This study identified two major ways to innovative teaching as reported by educators in Asia, in terms of whether or not technologies are involved. The technology-oriented approaches were applied and regarded as important in areas such as assisting students’ learning and increasing the teacher–student interaction. The importance of the non-technology-oriented innovations lay in, for example, enhancing students’ independent learning ability, creativity and self-reflection, with features such as cross-disciplinary collaboration, creativity, active learning and the facilitation of teaching. The innovations addressed both students’ academic and non-academic aspects and teachers’ work. The participating educators also recommended improvements for the innovations, such as catering for students’ diverse needs and evaluation by different stakeholders. The findings suggest that the characteristics of institutions might be associated with the nature, aims, focuses and evaluations of the innovations.

The teaching innovations identified in this study showed a difference from the prevalent view in the literature that technology is a core element of teaching innovations. The innovations also had a wide variety of aims and directions worthy of development. Therefore, academic learning and performance should not be the only dimensions for judging the effectiveness of teaching innovations. Other aspects of student development, such as the management of emotions, the ability to collaborate with others, problem solving and critical thinking are also important directions for teaching innovations. These competences play an important role in cultivating the twenty-first century competence of individuals (UNESCO, 2016).

As an exploratory study, the results provide potential directions for further investigation. For example, there is a need to gather more details about: educators’ views on areas such as active learning and engaging students, and the reasons for smaller institutions using less technology in their teaching innovations. Another area for further study is the evaluation of the effectiveness of teaching innovations, which remains at an immature stage of development. In this research, some of the innovations were not evaluated or evaluated only in terms of their short-term effectiveness. There is a need to evaluate teaching innovations from broader perspectives, and examine how effectiveness may differ in terms of students’ background and learning styles as well as teachers’ characteristics. Future research on these aspects may allow us to show how contextual and environmental factors influence the effectiveness of teaching innovations, so that they can be better designed and implemented.

Note

1. With reference to the Carnegie Classification of Institutions of Higher Education (http://carnegieclassifications.iu.edu/), institutions with 10,000 or more students were classified as “large” and those below 10,000 students were considered “small” as a simplified classification.

References


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Student persistence in open and distance learning: success factors and challenges

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Middlesex University London, London, UK, and
T.M. Wong
The Chartered Institute of Linguists Hong Kong Society, Hong Kong

Abstract
Purpose – The purpose of this paper is to identify the success factors and challenges for students studying in an open and distance learning (ODL) mode and recommend strategies for student persistence based on the findings.
Design/methodology/approach – Three groups of ODL students with various levels of study performance – nine high-level, nine mid-level and eight low-level students – were invited to participate in three focus group interviews. They were asked about their motivation, success factors and challenges in their studies.
Findings – The different groups of participants showed observable variations in their response. The mid-level students believed that word-by-word rote memorisation was their best strategy in preparing for examinations. The low-level students believed that they needed to master multitasking to learn well in tight schedules. All these weak student participants considered quitting at some points, but no high-level student did so. To improve student persistence, the authors focus on meeting the needs of weak students and recommend the following actions for student persistence: add a time management and study skills component to existing courses for students to practise; appoint advisors to distance learning students to help them create an appropriate study plan and acquire a sense of belonging; make learning videos short and engaging; consider adopting student leaders or peer tutors that have been used successfully in full-time study; and conduct focus periodically with students to hear their views.
Originality/value – This study revealed the factors contributing to student persistence in ODL for the students of various levels of study performance. The results help in formulating measures to meet the diverse needs of ODL students for persistence in their studies.

Keywords Distance learning, Retention

Paper type Research paper

Introduction
The landscape of distance learning (DL) is increasingly competitive. With the availability of alternative education opportunities such as massive open online courses (Wong, 2016), open and distance learning (ODL) institutions are facing great pressure to maintain their quality of education delivery and student satisfaction for student persistence (Sembring, 2015), and formulate measures to cater for diverse student needs (Li et al., 2015).

This paper reports a study on student persistence in ODL, focusing on the case of the Open University of Hong Kong (OUHK) – an institution featuring the provision of flexible education modes with both full-time face-to-face (F2F) and part-time ODL study...
programmes. When the OUHK (formerly known as the Open Learning Institute (OLI) of Hong Kong) opened its door in 1989, there were fewer tertiary institutions in Hong Kong with full-time study programmes than there are now. It is fair to say that the OLI was the only established education provider focusing on DL. The OLI gained university status in 1997 becoming the OUHK. Over the years, conventional tertiary institutions have been entering the part-time study market to compete with the OUHK. The OUHK started to offer full-time study programmes shortly after the turn of the century, and it currently has roughly the same number of full-time and part-time students. As the city’s population continues to age, the number of prospective students is reducing with more education providers today than 10 years ago. We have practical reasons and a moral obligation to make sure that our DL students are successful.

Every student who drops out implies a reduction in the institution’s income. Failed students have spent time and money to no avail. In this study, we aim to explore ways to improve student persistence in our DL courses.

The following section includes a literature review covering student persistence models, dropout factors, persistence strategies used by students and retention strategies employed by institutions. This is followed by the methodology for this study, the results and recommended actions for student persistence that are worth considering.

Literature review
This section reviews related work on student persistence, including various models, factors affecting student retention and dropout, persistence strategies used by students, and retention strategies employed by institutions.

Models of student persistence/attrition

Tinto’s (1975) student integration model. Tinto found that students’ personal characteristics (e.g. age, gender and attributes) and prior experiences (secondary school) influence their academic and social integration. Academic integration refers to students’ academic performance and intellectual development, while social integration refers to students’ interactions with faculty members and peers (Tinto, 1975). When both these elements are successful, students will be more likely to persist and achieve their graduation goal (Rovai, 2003; Sweet, 1986). However, Tinto’s work was concerned with full-time students and may not be adequate to explain the attrition of DL students. Tinto’s model spawned the development of additional models by other researchers.

Bean and Metzner’s (1985) student attrition model. Bean and Metzner built a model for mature and part-time students based on Tinto’s and other psychological models. They argued that older students have less interaction with each other, and usually seek support from family and friends. The model has four groups of variables, namely:

- academic variables, such as learning habits, advising and programme fit;
- background variables, such as age, goals and prior academic performance;
- environmental variables, including financial situation, employment and family responsibilities; and
- academic outcomes, such as GPA and psychological outcomes (stress, satisfaction, goal and institutional commitments).

Rovai’s (2003) composite persistence model. Rovai created a composite persistence model based on the models of Tinto (1975), Bean and Metzner (1985) and research results on student skills (Cole, 2000; Rowntree, 1995), distance learners’ needs (Workman and Stenard, 1996), and matching teaching and learning styles (Grow, 1991). The composite model focuses on student
persistence in distance education. Its factors are categorised as student characteristics, student skills, and external and internal factors affecting students after admission. The student skills category includes computing skills, information literacy and time management. The internal factors category contains consistency and clarity of online programmes; policies; procedures; e-learning systems; students’ self-esteem in the mastery of e-learning tools; measurable learning objectives; a sense of identification with the institution; interpersonal relationships (with peers, faculty and staff); the accessibility of support services (libraries and advisors); and the matching of learning and teaching styles (a directive teaching style with self-directed students).

Factors for student retention and dropout
Recent studies on student persistence and attrition in ODL have found that facilitating factors and challenges experienced by students can be personal, motivational and institutional.

Individual student factors. Personal factors. Having realistic expectations at the beginning of a study programme about the amount of work required is a student success factor (McGhie, 2017). Those students tend to take responsibility for their own learning and are committed to their studies. They consciously choose suitable learning strategies and work hard with effective time management.

Students with unrealistic expectation lose interests in their studies in the face of a higher-than-expected workload. In Grebennikov and Shah’s (2012) five-year survey, courses not being “what students had expected” (p. 228) were ranked very high as a dropout factor in the first year of study. Lacking adequate preparation and dedication makes students regard their studies as challenging (McGhie, 2017).

The amount of time and effort expended in a study programme is influential in a student’s persistence (Yang et al., 2017). Studying is an investment, and the more time students have invested, the less likely it is that they will withdraw (Park et al., 2011).

In Sweet’s (1986) study, most distance learners dropped a course due to a lack of time to adequately study its materials. In a study of attrition factors for ODL, 62.8 per cent of respondents were unprepared for the examination, among which “not enough time to study” was the major reason (Tladi, 2013, p. 79). Work responsibilities have also been cited as a hindrance. According to Tladi (2013), students who are employed and have family responsibilities have greater attrition and less commitment to study independently. They made little use of available support even when they needed it.

In online nurse practitioner study programmes, Knestrick et al. (2016) identified students being over 40 years of age as a predictor of attrition. They explained that students who are older than 40 have more family responsibilities and have been away from formal education for longer.

Motivational/psychological factors. Motivation is important for persistence. Over two-thirds of participants from an online programme cited “sense of accomplishment”, “mastery of specific skills”, “perceived utility of learning” and “meeting career goals” as important reasons for them to complete their studies (Yang et al., 2017, p. 33). Personal goals, a sense of community and family support were also influential psychological motivators which boosted student persistence.

A lack of motivators may lead to dropout. In a study of engagement, Kahu et al. (2013) found that mature distance students who had considered leaving were unsatisfied with their university experience. Also, in a study of student nurses, Ten Hoeve et al. (2017) found that problems in achieving learning goals and working in a team, and uncertainty about one’s knowledge and abilities, caused attrition. Perseverance and the drive to become a nurse were the keys to persistence for some.

Institutional factors. Quality of the programme. It was found that a well-organised study programme and the competence of teaching staff improve student persistence
Dissatisfaction with a training programme is often associated with the low quality of the programme and its teaching staff. Content of the programme. The relevance of the programme in meeting personal and professional needs and the perceived amount of learning influence student persistence in online programmes (Yang et al., 2017). Why do some students with enough time to study choose not to do so? Tladi (2013) found that the main reason was demotivation resulting from a high workload and difficulties in understanding the study materials. Students who considered giving up mentioned having negative experiences on the course because of difficult content or poor class organisation (Ten Hoeve et al., 2017).

Institutional support. Raciti (2012) suggested that efforts to build a strong relationship between students and lecturers/tutors encourage student persistence. Institutional support was found to be helpful to students (Yang et al., 2017). One participant expressed gratitude towards the faculty and staff, saying “The first person I talked to was [Mr. J]. [Mr. J] was so enthusiastic. He answered my questions and was very encouraging that it was a great programme. Throughout my two years he has been my advisor […] any time I had a question or wasn’t sure which class to focus on during my electives I would call [Mr. J]” (p. 32). All student participants who considered quitting were negative about the support from the teaching staff (Ten Hoeve et al., 2017). The authors concur on the importance of quality support from teaching staff and counselling services, especially for online study.

Persistence strategies by students
Expect hard work. Students who have a smooth transition from high school to university start with an expectation that universities will involve hard work and be very different from schools. They focus on their goals and are fully aware of their own responsibility in learning. When asked about how to overcome challenges, a student responded that he/she stayed focused and worked hard all the time (McGhie, 2017).

Manage time. Yang et al. (2017) identified time management skills as an important factor for student persistence in online programmes. Effective time management is more important for part-time students who have to balance coursework, a job and family responsibilities. Successful students are well-organised and adopt effective time management strategies (McGhie, 2017). One participant reflected that “With all the assignments, tutorials and tests that had to be done, effective time management was going to be of utmost importance. I would then record all test dates and due dates as soon as they were made available to me and then try and allocate time that I estimated to be efficient for each task at hand. I also tried my best to study before the time for a test and not leave things for the last minute as I found that it only creates more anxiety and stress” (p. 417).

Build constructive social support. Distance learners do not meet their tutors, lecturers and classmates regularly. Faculty and support staff have problems in identifying students who are at risk of feeling isolated (Park et al., 2011). The sense of isolation increases the risk of dropout. Kahu et al. (2013) believed that having friends is particularly important for mature distance learners who struggled to fit into the university culture.

Make the right friends. In McGhie’s (2017) study, all the successful students emphasised the importance of making “right friends”, i.e. those who support, encourage or assist them academically. They chose friends who were determined to succeed, and they worked together and supported each other. A student shared the following comment: “Surround yourself with positive peers or better yet help encourage and motivate others to join you in reaching a goal. Knowing you can help and support each other makes learning less stressful and fun” (p. 417).

Seek help from lecturers. Successful students in McGhie’s (2017) study sought help from teaching staff as well as from peers. They reported that they were not afraid to ask
questions. As a participant explained, “not be afraid to ask for help, nobody expects you to always be good at everything”. Another student remarked, “I asked questions when something was not clear and I went for consultation and I received clarification on work covered” (p. 418).

Gain encouragement from the family. Encouragement and support from family members are important motivation. They help students to stay focused and work hard (McGhie, 2017; Ten Hoeve et al., 2017).

Retention strategies by institutions

Course design. Link study to student work. Yang et al. (2017) recommended linking coursework to students’ professional work so that students can apply what they have learned.

Design courses flexibly. Park et al. (2011) suggested that course designers should offer choices in learning activities and assignments to accommodate students with different learning styles. This calls for an assessment of students’ learning style preferences at the beginning of a course. To improve student retention, an Australian university introduced flexible timetabling as well as course design and delivery to suit the schedule of working students (Grebennikov and Shah, 2012).

Encourage collaborative work by students. Park et al. (2011) suggested that institutions should cultivate social interaction among online classmates to reduce attrition. Kahu et al. (2013) also saw a need for distance learners to work with peers on collaborative tasks. Connections with peers neutralise the sense of isolation often experienced by distance learners.

Institutional support. Make support services accessible. If a mentor has been assigned to each student to provide support in times of crisis, attrition will be reduced (Park et al., 2011). Under its retention project, an Australian university extended the operation of facilities, services and consultation outside normal hours. Colleges of this university supplied part-time students with information on available financial aid, scholarships, emergency funds, the costs of books and internet access (Grebennikov and Shah, 2012).

Build relationships with students. A learning community connects students to each other, to the institution and to the resources that they need (Rovai, 2003). A strong relationship with teaching staff helps students to make the decision to stay on a course (Raciti, 2012). Yang et al. (2017) recommended the creation of support networks to help solve students’ personal or professional problems. Rapport between students and staff should be established at the very beginning (Park et al., 2011).

Contact students proactively. Park et al. (2011) suggested that faculty and support staff should take the initiative to contact students. They can send messages to students regularly and ask if they are encountering problems. Support staff taking the initiative to contact students is important because students who are facing problems may not seek help.

Looking after returning students. Counselling and guidance should be provided to returning students to improve retention (Park et al., 2011). The services should help students to assess the available resources, set realistic expectations for their performance, maintain study-life balance and reflect more on their initial intention to withdraw.

Methodology

The previous work on student persistence has produced a broad range of relevant models, factors and strategies, but it has yet to address the divergence of students from different backgrounds. In particular, it has been widely identified that the academic results of students are highly related to their persistence or dropout (e.g. Brits et al., 2011; Sæle, 2016; Wong, 2017). For students with different levels of academic performance, it is expected that there are various success factors and challenges for their persistence in studying.
This study aims to identify the success factors and challenges for the persistence of ODL students with different levels of academic results. Focus group interviews with students were conducted to elicit in-depth information with open-ended questions. A total of 135 students from two high-level computing courses in software engineering and distributed systems at the OUHK were invited to participate in the interviews. The students who agreed to participate were divided into three focus groups according to their final course scores, namely, nine high-level, nine mid-level and eight low-level students. The focus group interviews were conducted after the final examinations of the courses, so that we knew the performance of each student. The course results had not been announced when the focus groups were conducted, so the students expressed their views without knowing their final grades.

The participants were asked about the factors affecting their persistence in studying, the challenges they encountered and their overall education experience at the OUHK. Their responses were recorded and categorised according to the focus group to which they belonged.

Results

We report below the results of the focus group interviews on the students' motivation, success factors and challenges in their studies.

Motivation

Getting a degree in computing was the most common motivation for students. Three out of nine high-level students were also motivated by the practical use of what they had learned. None of these students had ever considered giving up the course/programme.

Three of the nine mid-level students needed a push from their bosses or colleagues to start their degrees. These students seemed to have had a rougher career or study path than the high-level students, with some of them having considered quitting.

The low-level students complained that the study materials and assignments were boring. They were not motivated by pleasure in their studies, perhaps due to their being in the survival mode all the time. Most of them had thought about giving up at some point.

Success factors

The success factors differed according to student performance. The high-level students named success factors that were under their full control, but the mid- and low-level students named numerous success factors that were beyond their control. The high-level students were clearly more effective problem solvers by focusing on the things they could change.

Success factors for high-level students.

Time management. The high-level students identified time management as the most important success factor. They started early and allocated more time for studying the challenging topics. They made efficient use of their time and would, for example, study while travelling on a train. They also spread their study effort relatively evenly throughout the term.

Study skills. These high-level students jotted notes when reading or attending classes, with one participant even drawing mind maps to relate concepts. They were also good at using search engines and could learn independently.

Observing advice. In DL, prerequisites are often advisory rather than enforced. The high-level students observed the advisory prerequisites by taking courses in a progressive order. They also considered the course contents before enrolling.

Assigning purposes to activities. These good students assigned purposes to learning activities and expected to learn by completing assignments. For example, they tried to complete all assignments in the course even when only the best three scores (out of four) were used in calculating the final score. (In contrast, the low-level students only regarded
assignments as a means to pass the course. Some of these weak students would identify the most challenging assignment and skip it.

**Success factors for mid-level students.** Memorisation. The mid-level students considered memorisation to be the most important success factor.

Class attendance. Once every two weeks, there was an optional tutorial class. Even though these classes were video-recorded for students’ review online afterwards, the mid-level students worried about technical or organisational mishaps with the recordings and, therefore, recognised the importance of attending the tutorial classes.

Examination tips. The mid-level students found it important to get an examination study guide and/or specimen examination papers from the instructor. They were delighted when a student shared a past examination question on an instant messenger chat group for the class. The mid-level students were exam-oriented.

Examination schedule. The mid-level students wanted the examination dates to be spread out more, so that they had adequate time to study between two examinations.

**Success factors for low-level students.** Adequate time. The low-level students thought that having adequate time was important. Their solution to a heavy workload was hoping to do less, which was not a real solution *per se*. This differed significantly from the high-level students’ approach to managing time effectively to accomplish more.

Good health. These weak students acknowledged the importance of good health, without saying explicitly whether good health is a result of a specific life style or good genetics.

Good luck. The students wanted to have good luck in choosing topics to study for the examination.

Memorisation. The low-level students not only claimed that rote memorisation was useful, but they also said that they would forget everything after the examination.

Choosing easy assignments. There were four assignments in the course but only the best three scores were used in calculating the final result. The weak students preferred to take a shortcut by skipping the most difficult assignment.

Ability to multitask. The weak students thought that multitasking allowed them to learn more in a short time (despite research showing that multitasking is bad for learning (Dzubak, 2008)).

**Challenges**

*Common challenges.* Some challenges were identified by only a certain focus group, but they are still shown below as common challenges if they affected other focus groups. The low-level students tended to name less challenges than the other two groups of students.

Too much to learn. An OUHK DL course typically covers more content than an equivalent F2F course at the same or other institutions[1]. Therefore, the participating students generally regarded it as challenging to handle the extensive course contents.

Limited sharing by tutors. A course may have multiple tutorial groups led by different tutors; and the tutor of a tutorial group may not share study materials with students in another tutorial group. The participants found it beneficial to have access to all the materials used by all tutors for the same course. The course coordinator should convince tutors to share their materials freely.

Unfriendly course registration systems. The course registration system did not prevent students from enrolling on courses which did not fit their intended major, courses with time conflicts or courses that could not be counted together due to overlapping contents. Students needed to be very careful in enrolment, and such checking should have been done by a computer system.

Late release of model answers. Not all model answers for assignments were disseminated for students’ learning, and sometimes they were posted too late.
Expensive tuition. Employers rarely subsidise tuition for their employees, or only pay a small portion. DL students considered the tuition fee to be an important factor, and chose the OUHK because of the competitive tuition fee level in DL. For example, a student mentioned that an OUHK course cost HK$10,000 while a competitor charged HK$17,000.

Challenges for high-level students. Not enough comments on marked assignments. The high-level students would like to see more comments by the tutor who marks their assignments. Examination not long enough. The examination normally lasts for 3 h for a course. While this may appear to be a long time, the high-level students still wanted to have more time in the exam so that they could think deeply and write more. The mid- and low-level students did not complain about this, probably because they did not have as much to write in their answers.

Overlapping content among courses. Some topics are required background for students to handle other courses. In conventional study programmes, the topics are covered in mandatory prerequisite courses. However, in our DL programmes, we want to give students the flexibility to take courses in any order, and so we may embed fundamental topics in more than one course. High-level students interested in learning new material complained a little about seeing the same topics covered more than once in their study plan.

Contents not up-to-date. The high-level students complained that some course materials were dated. They were motivated to learn the latest contents, while the mid- and low-level students focused more on passing the course.

Assignment questions not posted at the beginning. Not posting all assignment questions at the start of a course prevented the high-level students from planning their time or starting ahead of schedule. In the worst scenarios, some assignment questions were posted less than one month from the due date.

Unclear learning outcomes. Some learning outcomes for the courses were reported to be unclear. The high-level students wanted the learning outcomes to be clear, so that they could focus their effort better.

Video-recording of tutorials not organised in small chunks. The tutorials were video-recorded as one big chunk, i.e. 2 h for a tutorial. The video feature of our online learning environment was also not considered user-friendly. If a student had watched half of a tutorial and then stopped, to resume viewing the next day, she/he has to start from the beginning again and painstakingly advance to the previously paused point.

Challenges for mid-level students. Bad tutors and course coordinators. Although most of the tutors were good according to the mid-level students, some were viewed as poor. Also, some course coordinators were seen as irresponsive and would not answer e-mails or questions on the forum of the university’s learning management system.

Bad study tips. The mid-level students claimed to have been misled by unjustified messages (from some tutors or classmates). They said that, in the marking of assignments or exam papers, some markers looked for specific keywords only, otherwise no marks would be given. This assumed that it was possible or even common for questions to have a single correct answer (which runs against our belief that there are usually different ways to answer a question correctly). Some students actually believed that these were unjustified “study tips”.

Demanding examination schedule. Some mid-level students complained about having their last class just one day before an examination. The class and the examination the following day might not belong to the same course. This complaint revealed the university’s tight study schedule and limited classroom resources, and that the students relied heavily on cramming right before the examination.

Challenges for low-level students. Uninformed about course selection. Some low-level students acknowledged that they were unaware of course prerequisites, and others ignored them. They had little idea about the amount of work required to complete a course.
Lack of interest in the course content. These students were motivated by the improved job prospect of having a relevant degree. None of them took courses for interest, and they complained that the theories taught and assignments were boring.

Weak aptitude. The low-level students were poor in mathematics and programming.

Not having time to study. These weak students only attended one-fifth of the (optional) classes and viewed two-fifths of the recorded videos.

Lack of motivation. The final score is calculated from 30 per cent of the assignment scores and 70 per cent of the examination score. These weak students lost interests in completing the assignments due to their low weighting of 30 per cent. They found course contents uninteresting and unrelated to their jobs.

Challenging course content. The low-level students found the course contents to be tough, and over half of them had considered quitting.

Recommendations
Based on the results of this study, the following recommendations are made for the persistence of ODL students.

Train students on time management and study skills
The high-level students managed their time well. This suggests that all students should be equipped with effective time management to improve retention. Time management is more than just knowledge. A routine behaviour is formed after it has been repeatedly preceded by a cue and followed by a reward (Duhigg, 2012). Attending a lecture or writing an examination alone cannot change a habit. We should incorporate time management practices in multiple courses throughout the study programme to reinforce students’ effective use of their time.

The low-level students had poor study skills, relying too much on cramming and rote memorisation just before the examination, and they would forget much of it after the examination (Au et al., 2017). These students even had the misconception that multitasking helps them to learn more under time constraints. They need to learn and practise good study skills alongside time management.

Provide self-diagnostic tests or advisors to students for course selection
The high-level students considered advisory prerequisites carefully before taking a course, making sure that they took courses in an appropriate order. In contrast, the low-level students tended to ignore the advisory prerequisites. For students exempting from a course because of their advanced standing, the challenge may be even greater if the contents of their previous study do not completely match those of the course exempted. If students have a weak background or aim for a high final grade, they need to study more.

Two measures may help to resolve this problem. First, we can provide students with an online self-diagnostic test before they enrol on a course. The test score can predict roughly how challenging the course will be for a student. The diagnostic test can have multiple-choice questions graded automatically online.

Second, we can appoint a faculty member to serve as an advisor to the students. The advisor may meet the students F2F or talk with them on the phone. The advisor and the student may go through the student’s background and interests together to make sure that the student is making a right choice. This has the added benefit of putting a human face on the institution. Our recommendation on advising ODL students is consistent with Simpson’s (2013) view that institutions have a moral obligation to inform and counsel ODL students, which can improve retention and reduce students’ sense of isolation. Students should be encouraged to explore and think
through the advice before coming to a decision. A supportive and empathetic advisor can help to motivate weak students. To save commuting time, an advisory session can take place online.

**Improve learning videos and learning management systems**
Guo et al. (2014) listed some suggestions for making learning videos. For example, they argued that short videos within 6 min are more engaging; the videos should be interspersed with the instructor’s talking head with slides; and Kahn-style tablet drawings are better than static slides. The video-recordings of tutorials that our students watch on our learning management system currently last for 1 or 2 h and are unedited recordings of the computer screen and voice during tutorials. As noted earlier, the worst outcome is that, if a student does not finish the video, she/he will have to repeat watching the video from the beginning and advance to the right place. Our learning management system currently does not support pre-download for a smooth play regardless of the network speed, despite preloading being a common feature of many MOOC platforms.

**Facilitate peer learning**
A sense of community is an important part of online students’ learning experience (Sadera et al., 2009), but the best practices are hard to establish. Our learning management system provides a discussion forum for students to ask questions. However, the students preferred to use the instant messenger chat group they had set up. They may feel more comfortable communicating with fellow students than with teaching staff. In our full-time P2P programmes, students are recruited and trained as leaders and peer tutors to help others in sports programmes and computer laboratories. Peer learning is a cost-effective means to achieve the desired learning outcomes. We need to find out how to do this in ODL.

Although prior research suggests that group projects may be beneficial for DL students (Kahu et al., 2013), our DL students explicitly asked us not to give them group projects to do. DL students vary greatly in their time commitments, and having a non-committed teammate is frustrating. As many DL students already practise teamwork in their full-time jobs, the benefit of having group work in ODL may be less than that in full-time study.

**Conduct focus groups to get student feedback**
Questionnaires have been commonly used to get feedback from students. Surveys by mail or e-mail get dismal response rates, sometimes as low as 10 per cent or even lower. For our full-time students, we distribute the questionnaire in the last class to increase the response rate to around 75 per cent. Our participants told us that they had never been invited to a focus group before. They enjoyed the opportunity to communicate their needs to the university staff. The presence of teaching staff in the focus groups increased their confidence that some of their feedback would be used to improve the course. Some universities have published guidelines for teaching staff to conduct focus groups (Miller, 2010). ODL providers may explore the benefit of conducting focus group throughout the course instead of doing so at the end or combining the peer learning effort with focus groups. In this study, we invited students to come after the final examination. We set aside a budget to pay travel expenses for each student. If the focus group is conducted at the end of a regular class, we may even reduce or eliminate the travel expenses.

**Concluding comments**
Actions involve costs. But if we do not take appropriate actions, we may pay the price in the form of attrition. In distance education, it is desirable to achieve economies of scale, and resources invested to reduce attrition should be financially appealing. The decision to take a
recommended action may also depend on the calculated return on the investment, and not all recommendations suit all DL courses uniformly. In addition, education providers have a moral obligation to help students succeed. We hope that DL institutions will invest wisely in the future of their students.

Note
1. This is the result of how DL courses are developed at the OUHK, which involves a course author and field experts in the course development team. Each member identifies topics that they consider important, and the resulting course materials often include all the members’ favourite topics, exceeding the topics favoured by an instructor on a F2F course.

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Impact of e-servicescapes on student engagement: mediating impact of experience quality

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Abstract
Purpose – The purpose of this paper is to investigate the impact of design of e-servicescapes on student engagement in distance education (DE), and examine whether this impact is mediated by student experience quality.

Design/methodology/approach – Quantitative research approach based on cross-sectional survey design was adapted where data were collected using a structured questionnaire. Sample consisted of 252 undergraduates registered in the DE platform in Sri Lanka and was drawn using a simple random sampling technique. Collected data were analysed using the structural equation modelling.

Findings – Data analysis revealed that there is a direct significant impact of e-servicescapes on student engagement while this impact is partially mediated by student experience quality in the Sri Lankan context. Meantime, the social presence feature of e-servicescapes has the highest impact on student engagement.

Practical implications – Findings of the study provide an empirically validated model to boost up the student engagement and significantly contribute to the designing of the e-servicescapes of the DE institutes in order to offer a superior service to a wide array of stakeholders.

Originality/value – Even though e-servicescapes have been recognised as a driver of customer behaviour, the concept is fairly unexplored in the educational context. Due to its practical applicability in the DE context, this study contributes to the existing knowledge by presenting a novel conceptual model developed based on multiple theories to identify its impact on student behaviour.

Keywords Student engagement, Experience quality, E-servicescapes

Paper type Research paper

1. Introduction
Distance education (DE) is a system of education. It is a special arrangement that educates students who are geographically dispersed from teachers with the aid of educational technologies. Due to this dispersion, teaching behaviours are executed apart from learning behaviours (Keegan, 1980; Tavukcu et al., 2011), and thereby provide students with all the relevant study materials and instructions in printed or electronic medium by making them more liable towards their learning decisions and outcomes (Sun and Rueda, 2012). However, despite these flexibilities, this arrangement has resulted in the alienation feature. Students feel that they are isolated when learning in their own environment without access to the premises of the education institute or interacting with teachers and peers (Grey and Diloreto, 2016; Sun and Rueda, 2012). This may result in negative impact on the effective learning of students. With limited opportunities to interact, collaborate and receive feedback and social
support, remote students are required to utilise considerable extra time and effort in order to achieve better academic outcomes (Sun and Rueda, 2012). Consequently, many students demonstrate less engagement in academic activities (Sun and Rueda, 2012; Tuckman, 2007). Although, the alienation is a feature embedded in the DE system, identifying means to make students more closer and attached to the education institute and teachers, and thereby encouraging them towards academic engagement through a superior learning experience are paramount important in making the DE system more effective.

Service industry is one of the commercial industries that have been tremendously influenced by the developments in the Information and Communication Technologies (ICT) (Gunewardana, 2017). Education is one of such services which is subject to continuous development over the years. Students act as customers while participating in the co-production of education service by providing input to the service production process. Precisely, it involves mental stimulus processing by touching students’ minds and shaping their attitudes and carving their behaviours. Student can physically or mentally take part in the service production process where primarily information is processed through the proper communication (Writz et al., 2018). Due to the intangible and inseparable nature of service processes, it is essential to create the environment where the service is produced, i.e. servicescape, more appealing to the customers (Writz et al., 2018). Servicescape is a built environment which impacts the customer perception and thereby shapes their respective behaviours (Hopkins et al., 2009). In the DE context, it is not mandatory for the student to commute to the institution premises; rather, the institution can disseminate the relevant academic and non-academic related information through one or more communication mediums. Particularly, long-standing and well-established educational institutes are intensively using ICT to augment this process. They are proven as more beneficial as it has been identified that nowadays college students are frequent users of the internet (Wong et al., 2016). Students own digital devices through which they connect to the internet anytime and anywhere. They are willing to communicate digitally with the education institute with respect to academic and non-academic matters via the institute’s website (Duvall and Schwartz, 2000; Grey and Di Loreto, 2016; Preiser-Houy and Russel, 2011; Vogt, 2016). Website of a service provider is also a built environment, specifically a virtual environment, and through its features and design, customers interact with the service provider (Hopkins et al., 2009). It is the service setting where the service encounter occurs in the virtual environment and known as e-servicescapes. These virtual atmospheric elements need to be designed in a way that can effectively communicate with different stakeholders, particularly with the students, and thereby creating a strong link with them to bridge the temporal and geographical gap that exists between the teacher and the student (Hakim and Deswindi, 2015). Therefore, the website and thereby the e-servicescapes of the DE institute have a key role to play in overcoming the alienation feature embedded in the DE system (Duvall and Schwartz, 2000; Wong et al., 2016).

E-servicescapes have been receiving due attention among scholars in numerous service settings such as hospitality, retailing, gambling, banking, entertainment and healthcare. It has been identified as one of the drivers of customer behaviour and their behavioural intentions (Wong et al., 2016; Duvall and Schwartz, 2000; Hakim and Deswindi, 2015). The impact of the concept in the education context is yet to be explored (Theron and Pelser, 2017). Particularly, in the DE context, studies have narrowed their focus towards the learning management system (LMS), evaluation of LMS quality, student perception on LMS, role of the instructor in LMS and impact of LMS on student intentions and behaviours (Burch et al., 2017; Preiser-Houy and Russel, 2011). They have not diverted their attention on the entire virtual environment and how its design, visual appeal, interactivity, availability of relevant information, personalisation and ease of use influence intentions and behaviours of students. Importantly, physical environment has been identified as an influencer of student learning experience, behaviours and performance in the traditional education institutes.
The importance of physical environment is limited in the DE context as students do not essentially commute to the institutional premises. However, the website can be identified as the interface that links the institute and the student such that they continuously deal with the website throughout the student life cycle starting from the decision to get enrolled to the study programme (Burch et al., 2017; Hakim and Deswindi, 2015; Preiser-Houy and Russel, 2011). Thus, it would be better if the student can have a superior experience with respect to the academic and non-academic matters at each and every phase of the student life cycle (such as application, registration, teaching and learning, evaluation, graduation, support services as well as post-qualification). Therefore, the virtual environment needs to be designed in order to deliver a quality student experience. Accordingly, the evaluation of e-servicescapes, particularly in the DE context, and identifying its impact are fairly an unexplored area in the existing knowledge base (Harris and Goode, 2010).

In the Sri Lankan context, OUSL (2016) is the pioneer in the DE which offers a wide array of study programmes by eliminating the barriers for higher education. However, the pilot survey conducted with the undergraduates of The Open University of Sri Lanka (OUSL) revealed that their learning experience is below the expectations. The system has apparently failed to delight its customers. Further, their responses revealed that their perception on the design of the virtual environment they interact with, i.e. the institutional website, as a whole is not very satisfying.

On the other hand, student success is one of the primary objectives of any educational institute. However, previous registration and graduation statistics of the OUSL indicate that student persistence and their performance in academic activities are inconsistent with previous scholarly findings. Therefore, these prevailing conditions in the DE context, particularly in Sri Lanka, signal that attention should be diverted to the virtual environment as well as student persistence and performance. Interestingly, previous studies have extensively investigated that student performance and persistence are highly influenced by the level of student engagement (Sun and Rueda, 2012). This is confirmed by the theories such as Theory of Student Involvement, Theory of Student Attrition and Theory of Student Departure. Further, majority of studies have focussed on student-related factors that influence student engagement rather than institutional-related factors (Bates and Khasawneh, 2007; Kanuka, 2005; Sun and Rueda, 2012). By addressing the above highlighted knowledge gap prevailing in the existing knowledge base, this paper attempts to identify whether the virtual environment of the institute has an influence towards the student engagement in order to further enhance student academic performance while retaining them with the institute. Accordingly, this paper attempts to answer following two research questions relating to the e-servicescapes, student experience quality and student engagement which have not been previously answered in the DE context:

**RQ1.** Do e-servicescapes have an impact on student engagement in DE in Sri Lanka?

**RQ2.** Does student experience quality mediate the impact of e-servicescapes on student engagement in DE in Sri Lanka?

The remainder of this paper is structured as follows. First, literature on e-servicescapes, student engagement and student experience quality is summarised and integrated. Then, the conceptual model of relationships between variables examined is proposed followed by the research methods used to test the model. Finally, empirical results of the study are presented along with the discussion on results and conclusion.

2. **Literature review**

2.1 **E-servicescapes**

Physical environment where the service is delivered to its customers is termed as servicescapes. It includes overall layout, design decorations and aesthetics of the service
facility (Bitner, 1992). The term e-servicescapes has been developed by taking the characteristics of physical service environments and applying them to the online service environment (Koernig, 2003). Scholars have defined the online environment using a variety of terms such as e-scape, online physical environment, cybermarketscapes, online atmospherics, to name a few (Wong et al., 2016). Harris and Goode (2010) have presented a comprehensive definition for e-servicescapes as the atmospheric environment aspects in the virtual space when the service encounter occurs between service providers and a customer. It is the purposeful design of web environment to generate positive effects in present and prospective customers to encourage a favourable response (Dailey, 2004). Whenever a service encounter occurs, e-servicescapes have a key role to play in influencing and shaping customer perception and thereby their behaviours (Harris and Goode, 2010).

Dimensions of e-servicescapes initially have been developed based on servicescapes dimensions presented by Britner including ambient conditions, spatial layout and functionality, and signs, symbols and artefacts (Harris and Goode, 2010). Nowadays, dimensions of e-servicescapes have expanded and they are comprised of rich media, colours, music, interactivity, customisation, navigation, search paths, friendly interfaces, speed, care, privacy, security and timeliness of information (Harris and Goode, 2010; Griffith, 2005; Mari and Poggesi, 2013; Srinivasan et al., 2002; Wong et al., 2016). As a whole, they are evaluating the aesthetic appeal, layout, security, entertainment and functionality of the virtual environment (Jeon and Jeong, 2009; Harris and Goode, 2010). However, previous studies have not exclusively investigated the significant dimensions of e-servicescapes with respect to educational environment setting. Even though, owing to the unique characteristics of the DE system, it can be expected that students prefer the virtual environments which are visually attractive, personalised, secured, interactive and offer opportunities for social interaction as well as most importantly provide timely and relevant information that can be easily found and accessed.

2.2 Student engagement

Students enrolled into study programmes with the ultimate aim of enhancing quality of their lives. Education institutes, on the other hand, facilitate this by developing required knowledge, skills, attitudes and mindset within the student. However, these objectives can only be accomplished if both the parties play their respective roles properly. Considering the student, they need to invest effort as well as time into academic activities, i.e. get themselves engaged in academic activities (Astin, 1984; Sun and Rueda, 2012).

Student engagement has been defined as the quality of student effort and time utilised for academic activities (Hu and Kuh, 2003; Richardson and Newby, 2006). It is the need, desire willingness and compulsion of the student to participate and be successful in the learning process promoting higher-level thinking (Miller et al., 2011). However, majority of studies have identified student engagement as a behavioural phenomenon which deals with students’ time, effort and participation in academic-related activities (Kahu, 2013). Kuh (2009) and Krause and Coates (2008) have defined it as the amount of time and effort students devoted into their studies and other educationally purposeful activities. Accordingly, student engagement has behavioural as well as cognitive and psychological aspects (Vogt, 2016). Previous studies have identified four different forms of student engagement such as skill engagement, participation engagement, emotional engagement and performance engagement (Handelsman et al., 2005). Skill-promoting learning as taking notes in class and studying regularly are identified as skill engagement. Participation engagement happens in relation to others where the student tends to interact with teachers, takes part in group discussions with peers as well as asks questions in classrooms. Thinking of and usage of learning into real-life situations are referred to as
emotional engagement. Emphasis on obtaining good grades and doing well at examinations are examples for performance engagement. Despite the form of student engagement, previous studies have reported that it has a direct positive impact on educational outcomes such as student success, performance and achievement (Miller et al., 2011; Sun and Rueda, 2012). Importantly, educational institutes also have a significant role to play in enhancing student engagement as it has identified that the quality of services offered, level of interaction and communication with students as well as resources and learning environment facilitate student engagement in academic activities (Dassanayake et al., 2017; Vogt, 2016).

2.3 Student experience quality

Throughout the service journey, customer interacts with the service provider over several touch points directly or indirectly. Each of these interactions result in customer experience indicating that services are always accompanied by experience (Verhoef et al., 2009). Since this is the era of experience economy, customers demand more than a competent service that can fulfil their needs; rather, they are seeking experience which are engaging, robust, compelling and memorable (Gilmore and Pine, 2002). Therefore, it is pivotal to design services in a way that offers superior experience to customers. Meyer and Schwager (2007) defined customer experience as internal and subjective response of the customer to any direct and or indirect contact with the company across multiple touch points. Importantly, customer experience is not confined to the service consumption stage; rather, it considers the total experience which encompasses search, purchase, consumption and after sales stages of the service journey (Verhoef et al., 2009). In the DE context, students are the customers who compensate the effort of the service provider, i.e. the DE institute. In the educational context, predominately student experience was restricted to teaching and learning experience; however, it now encompasses student encounter with the administrative and support services provided by the education institute. Accordingly, it covers academic and non-academic experiences such as teaching, learning and assessment as well as university ancillary service aspects (Arambewela and Maringe, 2012; Douglas et al., 2008).

Previous studies have used customer experience to describe the customers' impression of the service they received. This is what customer feels rather than an action, indicating the emotional feelings throughout the service encounter such as happiness, anger, love, boredom, sadness and shame (Voss et al., 2008). These are strictly personal, internal, psychological, subjective and complex. Scholars have referred to this as customer perception of the parts of the service journey hence defined as customer experience quality. Customer experience quality therefore represents the perceived judgement about the excellence or superiority of the customer experience (Jutter et al., 2013; Tan et al., 2016). In the education context, student experience quality indicates the student perception on the variety of inputs they receive throughout their journey. They enrol into study programmes with numerous expectations. If those expectations on curricula, teaching, assessment, as well as support systems are met, students tend to rate their experience as a quality experience. It indicates the effectiveness of the learning experience of the student including academic and non-academic aspects, based on the affective analysis of service and its elements (Horvat et al., 2012; Neumann and Neumann, 1993). Since the focus is diverting towards the experience economy, in order to become successful in the market place, service organisations need to focus on delivering a superior experience to its customers. Particularly, in the education context, it has been identified that student experience is a vital antecedent to many initiatives in higher education (Arambewela and Maringe, 2012; Baird and Gordon, 2009) and student experience quality has an impact on behavioural outcomes of the student (Dassanayake et al., 2017).
2.4 Impact of e-servicescapes on student engagement

Impact of e-servicescapes on customer behaviour is one of the highly investigated areas in the service management literature. It has been identified that customer behaviours such as reuse, re-purchase, revisit, word of mouth communication and customer referrals are influenced by their perception on the virtual environment in retail, travel and tourism, entertainment and healthcare industries (Abou-Shouk and Khalifa, 2017; Cyr et al., 2007; Duvall and Schwartz, 2000; Harris and Goode, 2010; Wong et al., 2016). In the education context, student performance, satisfaction and usage were investigated with respect to the LMS rather than explicitly considering the entire virtual environment or website of the education institute (Miller et al., 2011; Sun and Rueda, 2012; Vogt, 2016). However, based on the scattered implied findings, an impact on student engagement could be established. Aesthetic appeal of the virtual environment including its layout and media enhances student interest and thereby results in behavioural outcomes by creating an emotional engagement in learning (Abou-Shouk and Khalifa, 2017; Chen and Wells, 1999; Sun and Rueda, 2012; Yang et al., 2003). When students find required information, they tend to visit the environment once again and this effect is strengthened when they can find information easily (Abou-Shouk and Khalifa, 2017; Bates and Khasawneh, 2007). Therefore, the technical easiness and assistance such as the availability of help desk is an important aspect (Sun and Rueda, 2012). Further, remote students prefer the interaction in order to overcome their isolation. High level of interactivity in the virtual environment enhances the student engagement (Miller et al., 2011). Certain online activities and tools such as discussion boards, online debates and brainstorming facilitate interaction and enhance the performance engagement of students (Sun and Rueda, 2012). Therefore, it is empirically evident that e-servicescapes evoke student behavioural responses just as bricks and mortar servicescapes do (Hopkins et al., 2009). This can be further supported by the Unified Theory of Acceptance and Usage of Technology (Venkatesh et al., 2003) which highlights that website design has a direct impact on the behaviours of the users. The design encompasses visual appeal, layout, interaction, as well as information available. Accordingly, based on the theoretical and empirical findings, this study proposes the following hypothesis:

$H1$. E-servicescapes have a positive impact on student engagement in DE in Sri Lanka.

2.5 Mediating role of student experience quality

In the physical service environment, service setting is one of the elements that affect customer experience (Fisk et al., 2000). Similarly, in the virtual environment, design of the website has the ability of creating a favourable impression in visitors’ mind and thereby making them satisfied with the experience they receive (Abou-Shouk and Khalifa, 2017; Hopkins et al., 2009). Aesthetic elements such as music, colours, fonts and media create an excitement within them and reshape their perception (Chen and Wells, 1999; Yang et al., 2003). Effective organisation of the website and the ease of navigation it creates make it easier for visitors to find exactly what they are seeking. It creates a pleasurable and rewarding online experience which induces them to revisit (Hopkins et al., 2009; Tan et al., 2016; Vogt, 2016). Messy environment creates negative emotions and subsequently it develops a dislike towards the website as well as the education institute (Hopkins et al., 2009; Sun and Rueda, 2012). For instance, even the font size is a matter to focus on. Other than finding the required information by themselves, the visitors prefer to have online help desk, prompt answer to their queries and quick feedback. Delays in responses, not working links and illegible letters create a bad impression (Abou-Shouk and Khalifa, 2017; Sauro, 2016). Therefore, it is empirically evident that when the e-servicescapes are more appealing, the student tends to create favourable emotions and define their experience as of high quality.
On the other hand, previous studies in the service settings have confirmed that customer experience quality is directly related with their behaviours. When customers emotionally perceive their experience with the service encounter as of high quality, it directly and positively influences their behaviours. This results in life time bond with the service provider and they become loyal customer with repeat purchases, positive word of mouth communications and recommendations to other customers (Kim and Choi, 2013; Verhoef et al., 2009). Similarly, in the education context, Entwistle and Tait (1990) have specifically reported a direct impact of student perception on what they receive from the education institute and their respective actions. When they bear positive emotions relating to their overall learning experience including academic and non-academic aspects with the institute, they are encouraged to invest more time and effort on academic activities (Dassanayake et al., 2017; Sidelinger and Booth-Butterfield, 2010). When students are exposed to meaningful learning experience, they become satisfied. They tend to realise that if they integrate more into academic activities, in return they will become more satisfied and successful such that they will invest more time and effort on academic activities. Therefore, it can empirically identify positive and direct impact of student experience quality and their engagement.

Accordingly, the empirical findings indicate that when students are offered with better e-servicescapes, they tend to rate their learning experience as of high quality and tend to engage more in academic activities. This can be elaborated using the Mehrabian and Russell Model (Billings, 1990). It emphasises that environmental stimuli reshape the feelings and emotions of an individual which ultimately influence his or her behaviour, such that perception on stimuli mediates the relationship between stimuli and response (Robbins and Judge, 2013). In this study, therefore e-servicescapes are environmental stimuli and student engagement is the response to the stimuli which is mediated by the student perception on learning experience, i.e. student experience quality. Accordingly, based on the empirical and theoretical ground, this study proposes following hypotheses to test the mediating effect of the student experience quality:

H2. E-servicescapes have a positive impact on student experience quality in DE in Sri Lanka.

H3. Student experience quality has a positive impact on student engagement in DE in Sri Lanka.


Based on the above-identified relationships, this paper proposes the following conceptual framework which is subject to empirical validation through a rigorous data collection and analysis (Figure 1).

3. Methodology
An extensive literature review was carried out to develop hypotheses and they were tested using the quantitative approach based on cross-sectional survey design. Self-administered questionnaire was used to collect primary data. In order to overcome common method variance (CMV), procedural remedies were taken at the questionnaire designing stage such as attaching a cover letter and separating measure psychologically using clear instructions.
A pilot survey was conducted and based on its results, required modifications were done to the questionnaire. Table I presents the operationalisation of study variables, whereas Table AI presents the indicators used to measure all the variables in the questionnaire.

The study was taken place in Sri Lanka. Population was restricted to all the registered students of the OUSL as at 31 March 2018. Due to the availability of a defined sample frame, sample was drawn using the simple random sampling technique. Self-administered questionnaire was distributed among the sample members using Google forms. After two weeks of initial mailing, a reminder note was sent to increase the response rate (Dillman, 1991). Altogether 800 questionnaires were distributed, after removing incomplete questionnaires, 252 were used in preliminary data analysis maintaining the effective response rate of 31.5 per cent (Saunders et al., 2011).

The sample of the study consisted of 252 registered students of the OUSL. Table II summarises demographic characteristics of the sample. The sample consisted of 68 per cent of females. Majority are in the age range of 20–35 years such that they can be grouped as millennials who have grown up with modern technologies. This is reflected through their knowledge on ICT as 74 per cent of respondents have claimed that they possess a good ICT knowledge. Further, 71 per cent are single considering their marital status. Majority (69 per cent) are full-time employed students such that it is fair to assume that they prefer a hassle-free learning process and thereby quality learning experience amidst their hectic lifestyle. Considering the level of contact with the OUSL website, 91 per cent have a moderate to very high level of contact, whereas many respondents (68 per cent) visit the OUSL website two to seven times per week. These statistics indicate that students have the ability and the willingness to use the OUSL website. Therefore, a proper design of the website can possibly reap benefits to the students and to the institute.

When analysing the data, initially parametric assumptions of linearity, normality, homoscedasticity of error term and multicollinearity were tested. Next, exploratory factor analysis was performed and unidimensionality of measurement scales of variables were ensured (Hair et al., 2009; Saunders et al., 2011; Sekaran and Bougie, 2014). Measurement model was derived as the next step and tested using confirmatory factor analysis. Model fit was improved using modification indices and by removing indicators of variables with standardised factor loadings below 4.5. Model fit of the measurement model was ensured using goodness-of-fit (GOF) indices. Reliability of variables was tested using the Cronbach’s α value and the composite reliability where all the values were above 6.0. Average variance extracted (AVE) was calculated to test the convergent validity of each variable. Since all the

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Dimensions</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-servicescapes</td>
<td>Atmospheric environment aspects in the virtual space when the service</td>
<td>Visual appeal</td>
<td>Harris and Goode (2010),</td>
</tr>
<tr>
<td></td>
<td>encounter occurs between service providers with a customer</td>
<td>Personalisation</td>
<td>Jeong et al. (2003)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interactivity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ease of use</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relevance of information</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social presence</td>
<td></td>
</tr>
<tr>
<td>Student experience quality</td>
<td>Perceived judgement about the excellence or superiority of the student</td>
<td></td>
<td>Dassanayake et al. (2017),</td>
</tr>
<tr>
<td></td>
<td>experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student engagement</td>
<td>Amount of time and effort students devoted into their studies and other</td>
<td>Skills engagement</td>
<td>Dixon (2010)</td>
</tr>
<tr>
<td></td>
<td>educationally purposeful activities</td>
<td>Emotional engagement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Participation engagement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Performance engagement</td>
<td></td>
</tr>
</tbody>
</table>

Table I.
Operationalisation of study variables
AVE values were greater than 0.5, convergent validity of the variables was established. Further, discriminant validity could also be established since all the AVE values were greater than squared correlations among variables (Hair et al., 2009). In addition, Harman’s single-factor analysis was conducted and due to the presence of more than one factor, the absence of CMV was noted (Podsakoff et al., 2003). Upon the validation of measures, finally the structural model was developed to test the hypotheses proposed.

4. Data analysis
4.1 Descriptive analysis
This study mainly focuses on three constructs such as e-servicescapes, student experience quality and student engagement where e-servicescapes and student engagement consist of six and four variables, respectively. Table III presents summary measures of those constructs.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Characteristic</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>81</td>
<td>32</td>
<td>Single</td>
<td>178</td>
<td>71</td>
</tr>
<tr>
<td>Female</td>
<td>171</td>
<td>68</td>
<td>Married</td>
<td>74</td>
<td>29</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td>Employment status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20</td>
<td>0</td>
<td>0</td>
<td>Full-time employed</td>
<td>173</td>
<td>69</td>
</tr>
<tr>
<td>20–35</td>
<td>224</td>
<td>89</td>
<td>Part time employed</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>36–50</td>
<td>28</td>
<td>11</td>
<td>Self-employed</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>51–65</td>
<td>0</td>
<td>0</td>
<td>Unemployed</td>
<td>57</td>
<td>22</td>
</tr>
<tr>
<td>More than 65 years</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study programme</td>
<td></td>
<td></td>
<td>Level of contact with the OUSL website</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certificate level</td>
<td>58</td>
<td>23</td>
<td>Very low</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>175</td>
<td>69</td>
<td>Low</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>19</td>
<td>8</td>
<td>Moderate</td>
<td>174</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td>48</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Very high</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Frequency of visiting to OUSL website in a week</td>
<td></td>
<td></td>
<td>Knowledge on ICT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 time</td>
<td>12</td>
<td>5</td>
<td>Very weak</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1 time</td>
<td>77</td>
<td>31</td>
<td>Weak</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2–7 times</td>
<td>148</td>
<td>58</td>
<td>Moderate</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>More than 7 times</td>
<td>15</td>
<td>6</td>
<td>Good</td>
<td>186</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Excellent</td>
<td>41</td>
<td>16</td>
</tr>
</tbody>
</table>

Table II. Demographic characteristics of the sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-servicescapes</td>
<td>1.97</td>
<td>4.67</td>
<td>3.30</td>
<td>0.57</td>
<td>−0.27</td>
<td>−0.39</td>
</tr>
<tr>
<td>Visual appeal</td>
<td>1.67</td>
<td>4.67</td>
<td>3.28</td>
<td>0.64</td>
<td>−0.16</td>
<td>−0.49</td>
</tr>
<tr>
<td>Ease of use</td>
<td>1.71</td>
<td>5.00</td>
<td>3.48</td>
<td>0.68</td>
<td>−0.27</td>
<td>−0.31</td>
</tr>
<tr>
<td>Relevance of information</td>
<td>1.86</td>
<td>5.00</td>
<td>3.47</td>
<td>0.64</td>
<td>−0.19</td>
<td>0.05</td>
</tr>
<tr>
<td>Personalisation</td>
<td>1.67</td>
<td>5.00</td>
<td>3.30</td>
<td>0.61</td>
<td>−0.19</td>
<td>−0.15</td>
</tr>
<tr>
<td>Interactivity</td>
<td>1.67</td>
<td>5.00</td>
<td>3.18</td>
<td>0.69</td>
<td>−0.09</td>
<td>0.64</td>
</tr>
<tr>
<td>Social presence</td>
<td>1.67</td>
<td>4.33</td>
<td>3.06</td>
<td>0.68</td>
<td>−0.13</td>
<td>−0.98</td>
</tr>
<tr>
<td>Student experience quality</td>
<td>2.10</td>
<td>4.98</td>
<td>3.89</td>
<td>0.66</td>
<td>−0.05</td>
<td>−0.38</td>
</tr>
<tr>
<td>Student engagement</td>
<td>2.48</td>
<td>4.96</td>
<td>3.90</td>
<td>0.42</td>
<td>−0.17</td>
<td>0.86</td>
</tr>
<tr>
<td>Skill engagement</td>
<td>2.00</td>
<td>5.00</td>
<td>3.75</td>
<td>0.52</td>
<td>−0.34</td>
<td>0.74</td>
</tr>
<tr>
<td>Emotional engagement</td>
<td>2.40</td>
<td>5.00</td>
<td>3.96</td>
<td>0.55</td>
<td>−0.23</td>
<td>−0.02</td>
</tr>
<tr>
<td>Participation engagement</td>
<td>2.00</td>
<td>5.00</td>
<td>3.74</td>
<td>0.54</td>
<td>0.29</td>
<td>−0.32</td>
</tr>
<tr>
<td>Performance engagement</td>
<td>2.50</td>
<td>5.00</td>
<td>4.13</td>
<td>0.56</td>
<td>−0.25</td>
<td>−0.39</td>
</tr>
</tbody>
</table>

Table III. Descriptive statistics of variables

Impact of e-servicescapes
and variables. Accordingly, the mean and the standard deviation vary between 3.06 and 4.13 and 0.42 and 0.69, respectively. Student engagement construct occupies the highest mean value as well as the lowest variation from the mean. Skewness and Kurtosis values are between −2 and +2 denoting the variables are approximately in a normal distribution. All the study variables were measured using a five-point Likert scale indicating 1 = strongly disagree and 5 = strongly agree. Accordingly, the mean value represents that all the respondents convey a higher level of agreement with the variables. This is further strengthened considering lower values occupied by the standard deviation.

4.2 Structural model
Based on the validated measurement model, the structural model was derived to test the study hypotheses. Figure A1 presents the structural model developed. Table IV presents the GOF measures used to evaluate the model fit. Values of GFI, AGFI, IFI, TLI and CFI are closer to 0.8, whereas RMSEA and CIMIN/df are below 0.08 and 3, respectively. Similarly, PRATIO has reached 0.9. Accordingly, all the absolute, incremental and parsimony indices have reached the cut-off values such that it can be concluded that the structural model used to test the hypotheses is appropriate.

4.3 Hypotheses testing
The hypotheses developed through a rigorous literature review were tested using the validated structural model. Table V presents the results of hypotheses testing.

All the hypotheses are significant at 95 per cent confidence level. E-servicescapes have a direct positive impact (β = 0.27) on student engagement as well as an indirect impact (β = 0.17) through student experience quality. Since the indirect impact is comparatively lower than the direct impact, student experience quality acts as a partial mediator. However, the total impact on student engagement is β = 0.44 where the direct impact has a higher contribution towards the total impact. When considering the variables of the e-servicescapes construct, all of them have a significant impact on student engagement with varying degrees. Social presence variable of the e-servicescape construct has the highest impact on student engagement (β = 0.28), while ease of use and relevance of information have the second and the third highest impact, respectively. Even though the impact is significant, personalisation variable has the lowest impact on student engagement. Altogether, the model explains 54 per cent of total variance (R² = 0.54) in student engagement which is acceptable in social science studies (Moksony, 1999).

Table IV. Goodness-of-fit indices of structural model

<table>
<thead>
<tr>
<th>Goodness-of-fit indices</th>
<th>CIMIN/df</th>
<th>Absolute</th>
<th>Incremental</th>
<th>Parsimony</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>GFI</td>
<td>AGFI</td>
<td>RMSEA</td>
</tr>
<tr>
<td></td>
<td>2.75</td>
<td>0.81</td>
<td>0.79</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Table V. Results of hypotheses testing

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>β</th>
<th>p</th>
<th>Result on hypotheses</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>0.27</td>
<td>0.00**</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>0.28</td>
<td>0.00**</td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>0.61</td>
<td>0.00**</td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
<td>0.17</td>
<td>0.00**</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Note: **p < 0.05
According to the findings of the hypotheses testing, when virtual environment and its components are designed properly, i.e. better the e-servicescapes, it will eventually enhance the student engagement in academic activities. Due to the partial mediation of student experience quality, a properly designed virtual environment creates an appealing learning experience to students such that they invest more effort and time on academic activities. Even though students are not highly satisfied with their learning experience or rate it as of high quality due to higher impact of e-servicescapes on student engagement, priority should be given to the design of the e-servicescapes. Importantly, a significant variation in the student engagement is explained by the overall model. This indicates that the design of the virtual environment plays an important role in shaping the behaviour of students. Therefore, decision regarding the design of virtual environment should be taken with due care as it ultimately influences the overall effectiveness of the DE system significantly.

5. Discussion and conclusion
5.1 Discussion
Since the inception, DE has been identified as one of the most effective modes of education. It is subject to continuous development as a result of revolution in ICT coupled with social and demographic environmental changes. However, previous studies have identified comparatively lower academic engagement of students in the DE context which can be attributed to the system-specific alienation feature as well. Since students are not essentially required to visit the institutional premises, creating a virtual environment in order to overcome the alienation is of paramount importance. Therefore, this study looked into e-servicescapes and attempted to identify its impact on student engagement.

E-servicescapes have received due attention among scholars in most of the service settings yet its impact on the education, particularly in the DE, has not been explored extensively. The findings of the study indicated that various dimensions of e-servicescapes have a significant direct positive impact on student behaviours. This aligns with the previous findings in different service settings. Data from service settings such as travel and tourism, retail, healthcare, as well as gambling have shown that customer revisit, re-purchase, referrals and loyalty are influenced by the design of virtual service environment (Cyr et al., 2007; Duvall and Schwartz, 2000; Hakim and Deswindi, 2015; Wong et al., 2016). Even though previous studies have not been carried out in the DE context considering the entire institutional website, studies on LMS have reported that easiness of usage, interactivity, entertaining aspects and availability of required information will positively influence the student behaviours. These different aspects can be identified as the constituents of the entire virtual environment. Therefore, the first finding of this study is well aligned with the previous findings (Abou-Shouk and Khalifa, 2017; Bates and Khasawneh, 2007; Chen and Wells, 1999; Miller et al., 2011; Sun and Rueda, 2012; Yang et al., 2003). When considering the individual dimensions of e-servicescapes, social presence has the highest impact on student engagement. This can be related with the alienation feature as students prefer to interact with the peers, teachers and other support staff since they have limited opportunity for face-to-face interaction. Therefore, isolated students are seeking for interaction opportunity in the virtual environment as well. However, it is surprising that despite the importance laid on the visual appeal and the level of personalisation dimensions by the previous findings, this study revealed that those dimensions have the lowest impact on student engagement. Typically, it has been perceived that university education is structured, rigid and standardised such that students may not expect higher level of personalisation. Further, majority of respondents are adults and employed students, and they prefer to focus on obtaining only the academic-specific information rather than auxiliary features. However, this is a finding which needs further investigation as it is contrary to the available knowledge.
Considering the mediating impact, the second finding of the study reveals that when students are offered with better e-servicescapes, it affects their perception on learning experience which they rate as of high quality and thereby manipulate their behaviours in terms of investing more time and effort on academic activities. This impact has not been previously investigated in the DE context. However, in other service settings, it has been identified that the design of the virtual environment incites customer emotions and thereby they act upon them. Therefore, customer behaviour is reshaped by the customer perception on their experience with the service setting to a greater extent. Accordingly, the second finding also aligns with the existing knowledge which highlights the importance of proper design of the e-servicescapes (Abou-Shok and Khalifa, 2017; Entwistle and Tait, 1990; Hopkins et al., 2009).

On the other hand, the demographic features of the respondents indicate that they have the ability and the willingness to deal with the e-servicescapes. Increasing use of the internet and development of associated infrastructure signal that students can be reached digitally more effectively in the DE context. Therefore, designing the e-servicescapes by incorporating features as easiness of use and availability of timely, accurate and required information which are presented in visually appealing manner will essentially attract the students towards academic activities. Further, due to alienation feature, the virtual environment that is designed in a way that students can interact with peers, teachers and other stakeholders makes the student feel that they are no longer isolated. Therefore, they can carry out their academic activities without any hassle despite their other personal and professional commitments. Accordingly, the findings of the study align with the existing knowledge base which highlights the significance of designing the e-servicescapes effectively since it can necessarily influence the student behaviour as physical servicescapes.

5.2 Conclusion
Unlike goods, environment where the services are delivered plays a significant role due to customer contact in service co-production. Exponential growth in ICT facilities has created new avenues for service delivery via the internet. Hence, the virtual service environment and its design have been identified as an antecedent of customer behavioural intentions and thereby behaviours in numerous service settings. Growth in ICT facilities, students’ willingness to communicate digitally and system-specific alienation feature set forth an importance upon e-servicescapes in the DE system. Despite its applicability, e-servicescapes in the DE context is an area which has not been explored extensively by the scholars; hence, this study bridges the empirical gap that existed in the knowledge base. Accordingly, the study attempted to identify the impact of e-servicescapes on student engagement and mediating effect of student experience quality on this impact. The study is primarily targeted at enhancing student performance and persistence by making them engaged in academic activities. For this purpose, study has identified e-servicescapes as a contextual- or institutional-specific factor and investigated its impact on student engagement by proposing an alternative explanation for changes in student engagement. This is an extension to the existing knowledge, particularly in the DE context, as previous studies attempted to identify the impact of student-related factors on their behaviours. As a whole, the findings of the study indicated that there is a positive significant impact of e-servicescapes on student engagement where student experience quality partially mediates this impact. Social presence dimension of e-servicescapes has the highest impact on student engagement. Accordingly, apart from theoretical and empirical novelty, the findings provide invaluable input to design the virtual environment in order to offer a superior learning experience to students and thereby make them more engaged in academic activities.
6. Implications, limitations and further studies

6.1 Implications

This study provides a novel contribution to the existing knowledge in the fields of service management and education, specifically in the DE context. The empirically validated conceptual model is unique to the DE system which has not been previously tested. Further, the measurement scale of e-servicescapes was developed by modifying the existing literature. Since it has proven that measures are valid and reliable, they can be used in future studies in the DE context.

Most importantly, other than the theoretical contribution, the study findings are enriched with practical implications. This study argued that website is a built virtual environment where the service encounter takes place throughout the student journey with the institute. The empirically validated conceptual framework explains a significant portion (54 per cent) of the changes in student engagement. Therefore, findings emphasise the importance of careful design of the e-servicescapes, i.e. institutional website. As the respondents have laid a greater emphasis on social presence dimension, in designing the virtual environment, attention should be paid on interactivity between academics, peers and academic support staff with students. Opportunities should be provided as chat bots, online forums, online help desk as solutions to alienation feature such that remote students should not feel that they are detached from the institute. Further, the website should be updated with the timeliest information to make the student up to date. The required information could be obtained as and when needed. Students can therefore perform most of the activities throughout the service journey without commuting to the institute premises. This offers hassle-free learning opportunities to students who are vested with personal and professional commitments other than academic obligations. Specifically, easiness of using the virtual environment must be addressed by designing a user friendly and attractive interface. Further, it is essential to make sure the smooth functioning of the website such as proper hyperlinks to necessary information, secured payment gateways and minimising the down time. Even though, the respondents have not placed an importance over personalisation and visual appeal dimensions of e-servicescapes, their impact has been identified as significant. Therefore, quality images and resolution, colours, fonts, sounds and, as a whole, the entire layout of the virtual environment can make it more attractive and act as positive stimuli which encourage their revisit. Incorporation of these elements offers a quality experience to students and thereby encourages them to visit the environment over and over again as people value quality of their experience nowadays which can manipulate their behaviours. Accordingly, the findings of this study adequately justify why it is essential to design a virtual environment of the DE institute. It has empirically proven that the proper design of e-servicescapes manipulates the student behaviour such that their performance and persistence could be ensured. Most importantly, by making the student engaged, their academic performance could be enhanced while retaining them with the institution without dropping out. This facilitates the accomplishment of objectives of the student as well as the institution and thereby ensures the effectiveness of the DE system. Particularly, in the Sri Lankan context, many people lose their higher education opportunities due to person-specific socio-demographic factors and limited access to national higher education institutes. Making the DE system more effective offers opportunities to wider society to pursue their academic desires and thereby making the nation literate. Therefore, the study as a whole has a national contribution in uplifting the well-being of the nation.

6.2 Limitations and future studies

Despite the theoretical, practical and social implications, there are few limitations in the study that could provide suggestions for future studies. There are multiple state and private educational institutes that offer DE-based study programme, yet this study was limited to
the students of the OUSL. Therefore, sample can be drawn including such institutes to widen the scope of and enhance the divert of future studies. E-servicescapes variable consisted of six dimensions which describe the characteristics of the virtual environment. This study only focussed on their combined impact on student behaviour. However, these characteristics could be further investigated individually in terms of their existing performance and weaknesses to identify how they should be addressed when designing a virtual environment. Student-related factors can also play a significant role in determining the student behaviour albeit the study was limited to institution-related factors. Students vary in terms of their ICT literacy and particularly in their demographic profile including employment status, family commitments, financial restrictions, prior education background and importantly their desire for future accomplishments. These variables could impact on student experience as well as behaviour such that they could be introduced to future studies to obtain a holistic picture. Finally, the study only captured the student perception on e-servicescapes. However, future studies could incorporate institutional perception on the service they offer to identify the gap between perceptions which indeed provide a valuable input to the virtual environment designing.

References


## Appendix 1

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicators</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construct – e-servicescapes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual appeal</td>
<td>This web portal is visually attractive</td>
<td>VA1</td>
</tr>
<tr>
<td></td>
<td>The web portal is aesthetically appealing</td>
<td>VA2</td>
</tr>
<tr>
<td></td>
<td>The web portal is innovative and creative</td>
<td>VA3</td>
</tr>
<tr>
<td></td>
<td>The web portal is very entertaining</td>
<td>VA4</td>
</tr>
<tr>
<td></td>
<td>The enthusiasm of this web portal is catching, it picks me up</td>
<td>VA5</td>
</tr>
<tr>
<td></td>
<td>The presentation of this web portal is interesting</td>
<td>VA6</td>
</tr>
<tr>
<td>Ease of use</td>
<td>The web portal is designed in a way that is easy for me to follow</td>
<td>EU1</td>
</tr>
<tr>
<td></td>
<td>The information on the web portal is well organised</td>
<td>EU2</td>
</tr>
<tr>
<td></td>
<td>The web portal provides simple and clear directions for use</td>
<td>EU3</td>
</tr>
<tr>
<td></td>
<td>I found it easy to move around in this web portal</td>
<td>EU4</td>
</tr>
<tr>
<td></td>
<td>The web portal and all of its linked pages work well</td>
<td>EU5</td>
</tr>
<tr>
<td></td>
<td>The functions on this web portal are easy to operate</td>
<td>EU6</td>
</tr>
<tr>
<td></td>
<td>In general, this is an easy web portal to use</td>
<td>EU7</td>
</tr>
<tr>
<td>Relevance of information</td>
<td>Each page clearly indicates what one can expect to find or do</td>
<td>RI1</td>
</tr>
<tr>
<td></td>
<td>Web portal provides accurate information to OUSL students like me</td>
<td>RI2</td>
</tr>
<tr>
<td></td>
<td>The information provided on the web portal is reliable</td>
<td>RI3</td>
</tr>
<tr>
<td></td>
<td>The information provided on the web portal is up to date</td>
<td>RI4</td>
</tr>
<tr>
<td></td>
<td>The information provided on the web portal is easily understandable</td>
<td>RI5</td>
</tr>
<tr>
<td></td>
<td>The information on the web portal is complete for my study decisions</td>
<td>RI6</td>
</tr>
<tr>
<td></td>
<td>I can find all the detailed information I need to carry out my academic activities</td>
<td>RI7</td>
</tr>
<tr>
<td>Personalisation</td>
<td>This web portal is tailored towards me</td>
<td>P1</td>
</tr>
<tr>
<td></td>
<td>If I want to, I can customise the web portal to what I like (e.g. changing colours, font, layout, etc.)</td>
<td>P2</td>
</tr>
<tr>
<td></td>
<td>The services of this web portal are often personalised to me</td>
<td>P3</td>
</tr>
<tr>
<td></td>
<td>This web portal treats me as an individual</td>
<td>P4</td>
</tr>
<tr>
<td></td>
<td>When communicating with the web portal I am addressed using my name</td>
<td>P5</td>
</tr>
<tr>
<td></td>
<td>The web portal makes recommendations that match my needs</td>
<td>P6</td>
</tr>
<tr>
<td>Interactivity</td>
<td>The web portal has a good keyword search facility</td>
<td>I1</td>
</tr>
<tr>
<td></td>
<td>All my queries are addressed quickly by the web portal</td>
<td>I2</td>
</tr>
<tr>
<td></td>
<td>This is a very engaging web portal</td>
<td>I3</td>
</tr>
<tr>
<td></td>
<td>This web portal is frequently updated</td>
<td>I4</td>
</tr>
<tr>
<td></td>
<td>Online help desk is available in this website</td>
<td>I5</td>
</tr>
<tr>
<td></td>
<td>This web portal has many interactive features</td>
<td>I6</td>
</tr>
<tr>
<td>Social factors</td>
<td>There is a sense of human touch whenever I interact with the web portal</td>
<td>SF1</td>
</tr>
<tr>
<td></td>
<td>There is a possibility of networking with my batch mates through the web portal</td>
<td>SF2</td>
</tr>
<tr>
<td></td>
<td>There is a sense of friendliness whenever I interact with the web portal</td>
<td>SF3</td>
</tr>
<tr>
<td></td>
<td>There is a feeling of belongingness whenever I interact with the web portal</td>
<td>SF4</td>
</tr>
<tr>
<td></td>
<td>There is a sense of human warmth in the web portal</td>
<td>SF5</td>
</tr>
<tr>
<td></td>
<td>There is a sense of human sensitivity in the web portal</td>
<td>SF6</td>
</tr>
<tr>
<td><strong>Construct – student experience quality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I am having a great time with my academic activities</td>
<td>SEQ1</td>
</tr>
<tr>
<td></td>
<td>My academic activities are interesting</td>
<td>SEQ2</td>
</tr>
<tr>
<td></td>
<td>I am having a very enjoyable time as an undergraduate</td>
<td>SEQ3</td>
</tr>
<tr>
<td></td>
<td>I am having a very pleasant experience as an undergraduate</td>
<td>SEQ4</td>
</tr>
<tr>
<td></td>
<td>My experience as an undergraduate makes me happy</td>
<td>SEQ5</td>
</tr>
<tr>
<td></td>
<td>My experience as an undergraduate is enjoyable</td>
<td>SEQ6</td>
</tr>
<tr>
<td></td>
<td>My learning experience is beyond words</td>
<td>SEQ7</td>
</tr>
<tr>
<td></td>
<td>I truly enjoy my learning experience</td>
<td>SEQ8</td>
</tr>
<tr>
<td></td>
<td>I believe that I receive a superior learning experience at OUSL</td>
<td>SEQ9</td>
</tr>
<tr>
<td></td>
<td>My learning experience at OUSL is excellent</td>
<td>SEQ10</td>
</tr>
</tbody>
</table>

*Table AI.* Operationalisation of study constructs *(continued)*
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicators</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construct – student engagement</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Skill engagement** | I make sure to study on a regular basis  
I stay up on the readings  
I look over class notes between day schools to make sure I understand the material  
I am always being organised  
I prepare a note by my self-referring course manual, lecture material, additional material uploaded to LMS and recommended reading books | SkE1 |
| **Emotional engagement** | I always put forth effort  
I find ways to make the course material relevant to my life  
I apply what I learn from this course to my life  
I find ways to make the course interesting to me  
I really desire to learn what is there in study material | EmE1 |
| **Participation engagement** | I enjoy face-to-face/online chats, discussions or e-mail convocations with the instructor and other students  
I actively participate in small group discussion forums with peers  
I help fellow students whenever possible in study-related matters  
I engage in online/face-to-face conversations (chat, discussions, e-mail)  
I get to know other students in my batch whenever possible | PE1  |
| **Performance engagement** | I focus on getting a good grade  
I am doing well on the tests/quizzes  
I communicate with faculty members regarding my academic performance  
I assess my own learning and progress continuously | PeE1 |

Table AI.
Appendix 2

Figure A1.
Structural model

Note: **p < 0.05

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Towards human resource development at Hanoi Open University

Hong Thi Thuy Nguyen
Department of Assessment and Quality Management, Hanoi Open University, Hanoi, Vietnam

Abstract

Purpose – The purpose of this paper is to investigate the roles of human resource development (HRD) in open universities. The study also intends to assess the current situation of HRD at Hanoi Open University (HOU) with an end view of proposing some suggested recommendations to enhance HRD to improve the training quality and effectiveness at HOU.

Design/methodology/approach – The study’s first two parts refer to HRD’s role in open universities. The third one summarizes the existing research literature on HRD used as theoretical base for the author to evaluate the current HRD at HOU in the fourth part. The fifth part involves the methodology to gather the data on HRD practices at HOU while the next two important parts deal with the study’s findings and recommendations for better HRD at HOU. The final part summarizes the study’s main points. Referring methodology, the survey data were analyzed through frequency, percentage and weighted mean as statistical tools.

Findings – The study’s findings show that HRD practices at HOU are not as effective as expected in terms of human resource quality, human resource structure and human resource management. There is a shortage of full-time well-qualified employees, inadequate and imbalance working positions, and un-synchronous, fragmented personnel management.

Originality/value – The study’s values are not only useful for building policies on HRD but also for developing strategies to train and foster capable and adequate staff in open universities’ academic environment and in HOU as well.

Keywords Open and distance education (ODE), Open educational resources

1. Introduction

In the integrated world, more than ever human resource development (HRD) has become an underlying factor for improving the training quality and effectiveness because it ensures organizations in general and universities in particular to recognize and promote the workplace to have the right person on the right job. Developing human resource has a significant impact on universities’ performances and leads to positive universities’ performances in the era of the Industrial Revolution 4.0 since this puts right employees into suitable places, which stimulates their morale, brings about business opportunities and increases levels of labor turnover (Pilbeam and Corbridge, 2006).

Human performances in universities reflect employees’ knowledge, skills, behaviors and values. Therefore, all expenditures on education and development are long-term investment from which universities can benefit from. Universities enhance the quality of the staff by providing education and promotion to enable them to gain different qualities to create benefits for universities.
In fact, developing human resources is essential for open universities in general and Hanoi Open University (HOU) in particular to train managers, teachers, technicians and service staff to meet the requirements for the high-qualified workforce. The study’s objective is to assess the effectiveness of current HRD at HOU to identify the areas which need improvements to enhance the training quality and effectiveness.

2. HRD in open universities

Human resources in open universities enable open and distance learners to access instructional contents through online teaching and learning processes, which satisfies learners’ various needs of education regardless of their age, time and location. However, if open and distance human resources are not sufficient enough, problems can arise and the expected benefits cannot be achieved. Successful open and distance education requires certain preconditions known as access to ICT tools, network infrastructure and especially well-qualified workforce.

According to Pausits (2015), universities as knowledge-based organizations have a strong focus on the quality of their academic staff, as they are responsible for teaching, learning and research. Another important prerequisite to a successful university is its services, which highly depends on the quality of the administration and management. The quality of management and academia will depend on the quality of HRD. Human resources are a fundamental determinant of quality in open and distance education. Therefore, open universities must work hard to enhance their employees' potential working competencies in virtual environment. Excellence can only emerge from a favorable professional environment based on open transparent and competitive procedures.

3. Literature review

3.1 HRD in open and distance education

HRD is identified as the process of improving individuals, groups and organization performances through training, career and organizational development initiatives (Nadler and Nadler, 2012). Organizations in general and universities in particular must continuously implement this process to assess and enhance the skills and knowledge of human resources to actively plan for ensuring employees having the required skills to perform their present and future jobs for universities’ benefits.

HRD enables universities to perform at their full capacities. Specifically, effective HRD ensures that universities are agile because their workforces are capable and flexible and have the correct skills at the appropriate time (Mittal, 2013). Understanding the influence of HRD on systemic practices, utility and university’s productivities is the key for enabling workforce improvements. Systemic practices refer to university training and development evaluation practices. Utility involves how well individuals can apply development opportunities to perform their jobs, while university results concern the extent to which a university achieves its mission or in other words university results.

A strong HRD environment is an essential component to demonstrate a commitment to university success (Kaifeng et al., 2012). Many forward-thinking universities are striving to create a positive university climate to retain valuable employees through various human resources development initiatives. HRD practices give employees opportunities and autonomy to contribute in making decisions. The effectiveness of HRD’s implementation has been assessed based on some models of HRD evaluation to obtain necessary information on HRD, including employee productivity, efficiency and overall satisfaction, to structure development programs to yield positive university results.

Open and distance learning (ODL) requires both education providers and students’ new skills to work and study in the virtual learning environment effectively. The majority of open and distance teachers and administrative assistants were trained to work in traditional education. The fast and continuous changes in online teaching and learning methods lead to
the urgent demand to train educational and administrative staff to deal with the traits which are totally different from conventional face-to-face education. As a matter of fact, incompetent ODL staff may lead to the high rate of distance learners’ dropout.

According to Owusu-Mensah et al. (2015), ODL is characterized as education delivered by technical media – print, audio, video or computer. Teachers, technicians and administrative staff of open universities should be equipped with necessary skills, knowledge and competence to retain distance learners to do the course. Open and distance learners need more information, guidance and support to study academically. A number of universities generally and the University of Education, Winneba (UEW) in Ghana particularly have paid much attention to carry out staff development programs and build policies on HRD for ODL staff in relation to the operations of open and distance education institutions. UEW decentralizes the learner support system with training centers located throughout the country to make ODL more accessible to open and distance learners. Besides, all enrolled learners are assisted by the core administrative members to study via the delivery training mode.

3.2 HRD’s effectiveness on organization’s outcomes

A number of research studies have focused on identifying the close relationship between HRD and organization outcomes and evaluating the effectiveness of HRD practices on organization’s performances to propose the effective ways to increase organization’s benefits.

Kirkpatrick four-level training evaluation hierarchy (dated back in 1959) is an HRD standard applied to evaluate training. The model has four hierarchical levels: reaction, learning, behavior and results (Kirkpatrick, 2010). This model shows the concept that an organization must be adaptive in adjusting to environmental conditions, as the more adaptive an organization is at meeting these environmental changes, the greater the probability of successful outcomes.

Phillips (2012) proposed suggestions for improving Kirkpatrick’s approach of training and development evaluation by modifying the fifth level to assess the organization’s return on investment (ROI). Measuring ROI for training is a complex and challenging issue for the training evaluation field (Subramanian et al., 2012). Assessing ROI enables organizations to get more information about the training program’s benefits and to identify which training programs contribute to organizations’ success.

The Paul Kearns and Tony Miller model of HRD evaluation (KPMT) is similar to Phillips’ ROI model (Wankhede and Gujarathi, 2012) in terms of showing the essential role of clear objectives for effective training evaluation. The KPMT model differs from the ROI model in providing HRD professionals with tools to implement the model. The KPMT model focuses on bottom line results using questionnaires, evaluation of existing training and process mapping. This model consists of four levels of evaluation, namely reaction to training, learning, transfer of training to the workplace and benefits.

Another model of HRD evaluation is Stufflebean’s model, which involves the evaluation of HRD to assess the effectiveness of HRD in a four-stage continuous process, namely context, input/training, process and product evaluation (Aaberg and Thompson, 2012). The first stage context involves the needs and goals of training. Context evaluation aims at identifying missed opportunities, focusing on determining how to utilize human resources to achieve universities’ goals. Input/training evaluation is known as the second stage, which concerns the components necessary for making the training process effective and cost beneficial. This evaluation addresses the effectiveness of specific aspects of the training program. The third process stage refers to specific organization evaluation on training implementation and performances. The final product stage identifies the outcomes, assessing training program’s strengths and weaknesses and making decisions for the sake of training program values. Product evaluation concerns the data collection to determine the extent to which the objectives are gained (Figure 1).
The four components of Stufflebeam's model closely interrelate and support one another for the sake of managers' decision making. The CIPP approach demonstrates the anticipated effects of the program components in the short- and long-term development. A deep analysis of the CIPP approach will show the way how human resources are developed and how universities will obtain their desired performances. This model is a very important foundation for universities to make decisions, which are very important for universities to make decisions regarding what need to be abolished and what further development is required to achieve the set goals.

According to Amar Kumar Mishra (2012), HRD and organization outcomes have close relationship and interact well with one another. Effective HRD practices have positive impacts on HRD climate, which leads to employees' and organization's outputs. Effective HRD practices in terms of performance appraisal, potential development exercises, training, job rotation and career planning have strong effects on HRD climate, employees' and organization's and financial outcomes. Sufficient HRD climate involves role clarity, collaboration, openness, trust, authenticity, pro-activity, teamwork and autonomy, which results in employees' outcomes. The major components of employees' outcomes are more competent people, better developed roles, better utilization of human resources, more teamwork, positive synergy, satisfaction and commitment. Employee's outcomes have mutual relationship with other factors known as technological upgradation and rationalized manpower. Organization's outputs result from positive employees' outcomes in terms of higher production, increased labor productivity and better quality, which leads to financial outputs known as increased profit.

The identification of the HRD components and assessment of the impacts of these components on organization outcomes are based on the following research model.

Research model. From Amar Kumar Mishra's (2012) point of view, there is a casual relationship between HRD and organization's outcomes. Effective implementation of HRD practices creates good HRD climate in organization. Putting the right person into the right place creates employees' positive attitudes, beliefs and motivation in organization. The favorable HRD climate in organization also enhances employees' performances. Warm and helpful working atmosphere motivates employees to achieve their personal best. Besides, adequate investment in technologies and effective employees' recruitment and retention stimulate employees to work more effectively. In addition, more competent and satisfied workforce enables organization to achieve more productivity and profit (Figure 2).

The model of relationship between HRD and organization’s outcomes in Figure 2 is adapted by the researcher to develop, validate and administer the Survey Checklist.
Questionnaire, assessing HRD’s implementation at HOU in terms of HRD practices, HRD climate, employees’ outcomes, organization’s outputs and other factors. The figure finds out the effectiveness of HRD implementation at HOU, which is used as a basis for proposing relevant recommendations for better implementing HRD at HOU.

4. Human resource development at Hanoi Open University
Presently, there are two main types of employees at HOU known as full-time employees and part-time ones. Full-time employees tend to hold only one job, having university loyalty and giving HOU more control over their times and efforts. They are willing to devote all their time and knowledge to university and ready to go through any tough times universities may encounter. Part-time employees do not have the feeling a sense of HOU’s ownership as they work for other universities at the same time. HOU cannot control their time and efforts; therefore, part-time employees are not likely to spend their time and efforts to qualify for university-sponsored benefits. This most prominent feature of these systems of human resources influences on managing and developing human resources at HOU effectively and synchronously. HOU has more than 370 full-time employees among whom 233 people (more than half) holding master’s degree, 129 people (nearly one-fourth) having bachelor degree, 36 people (around one-tenth) possessing doctor degree and 12 people (taking account for 3 percent) with intermediate and college level (Figure 3).
As far as Figure 3 is concerned, the percentage of full-time employees holding master degree accounts for the highest percentage (about 63 percent) while the percentages of the employees with bachelor and doctor degrees ranking the second and the third are 24 and 10 percent, respectively. The percentage of other degree is the lowest one of the total labor forces (around 3 percent). It can be inferred that there is a shortage of high-qualified full-time employees at HOU as only 10 percent of the total labor force holds doctor degrees.

Over the recent years, HOU has actively trained system managers, course designers, lecturers and technicians for e-learning. It has shown that HRD plays a vital role in improving the training quality and effectiveness at HOU. The project KOICA (Korean International Cooperation Agency) has enabled HOU to update infrastructure for online training to meet the demand of the Industrial Revolution 4.0. Having systematically applied advanced technologies in online teaching and learning, HOU have succeeded in creating an effective virtual learning environment. In fact, the quality of online teachers and service staff at HOU has satisfied the online training in terms of V-class, tutorial, self-correction and middle-term exams.

However, the current human resource management in online training at HOU is still at the modest level to catch up with the innovation in online teaching and learning processes. In order to enhance open and distance training’s quality, it is essential for HOU to identify the achievements and drawbacks of HRD. This will provide HOU with useful information about the human resource management. Based on the analyses of HRD’s strengths and weaknesses, HOU can make important decisions for what to remain, what to adjust and what to abolish in terms of HRD practices.

5. Methodology
The study used a quantitative research methodology relying on the data obtained through the survey questionnaire. According to Grohmann and Kauffeld (2013), quantitative HRD research using surveys offers a cost-effective means to determine specific HRD influences on an organization and to measure the extent to which HRD practices influence organizational outcomes. The survey is designed to evaluate HOU’s HRD in terms of HRD practices, HRD climate, employee outcomes, university outcomes and other factors, aiming at collecting the primary data from the employees at HOU for the answer: “How effective is HRD at HOU for enhancing the training quality and effectiveness”?

Regarding the sampling procedures, the target respondents of the study were 378 full-time managers and staff of HOU. The respondents were purposely chosen because they involve open and distance education either directly or indirectly. A total of 378 survey questionnaires were distributed to the managers and staff of HOU and the researcher expected to receive 355 valid survey questionnaires.

The survey questionnaire was conducted and regarded reliable to gather the data. There were two parts in the survey questionnaire concerning the objectives of the study. The first part was designed to collect the demographic profile of the respondents. The second part was seen as tools to measure the effectiveness of HRD at HOU.

The statements in the survey questionnaire were arranged accordingly using the five-point Likert scale ranging from 1 = strongly disagree, 2 = disagree, 3 = neutral (neither agree nor disagree), 4 = agree and 5 = strongly agree. The Likert scale with the method of validating and establishing the reliability was applied (Zikmund, 2010). The responses were computed to measure the agreement level in terms of means and standard deviations. The scale, shown in Table I, with its descriptive ratings for the questionnaire was used in the survey.

6. The findings and discussion
The survey questionnaire was carried out to collect the data on the current HRD at HOU in terms of HRD practices, HRD climate, employee outcomes, university outcomes and other factors. The respondents were asked to which extend they agreed or disagreed with the
proposition on a five-point Likert scale. The respondents’ evaluation of HRD practices at HOU is summarized in Table II.

Table II presents the respondents’ agreement on the implementation of HRD practices at HOU with the weighted mean of 3.61 and standard deviation of 0.87. The respondents agree that “Career opportunities are pointed out to juniors by senior officers at Hanoi Open University” and “The primary objective of the performance appraisal at HOU is mainly to develop their capacities” with the weighted mean of 3.64 and 3.63 accordingly. The respondents evaluate “The top management makes efforts to identify and utilize the potential of the employees,” and “Induction training provides an excellent opportunity for newcomers to learn comprehensively about HOU” at the same weighted mean of 3.60.

The results of Table II show that the respondents actually experience HRD practices at HOU. However, the descriptive rating is not very high which implies that HOU needs to implement more effective HRD practices in terms of providing employees’ career opportunities, developing employees’ capacities and utilizing employees’ potentials. As far as standard deviation is concerned, the average one referring HRD practices is 0.84, with all the statements’ standard deviations greater than 0.80 and lower than 1.00. This implies that the level of dispersion of data is not high and the measuring scale is quite good because it can measure the specific trend of the respondents’ replies rather exactly.

Table III discloses the weighted mean distribution and standard deviations in the respondents’ responses on the HRD climate at HOU. With the average weighted mean of 3.64 and low dispersion of standard deviation (0.84), the respondents agree with six out of eight statements describing HRD climate (questions 7, 8, 10, 11, 12 and 14) and have the neutral opinion for the two last questions of the provision (questions 8 and 13).

As far as Table III is concerned, the respondents agree with the two statements concerning “People trust each other at HOU” and “The employees are encouraged to take initiatives and do things on their own without having to wait for instruction from supervisors” with the highest
The respondents rated the two last statements “People at HOU are helpful to each other” and “Team spirit of high order at HOU” as neutral with the weighted mean of 3.36.

The results of this table show that respondents perceive HRD climate at HOU is not efficient enough, especially in supporting and building team spirit activities. Thus, HOU needs to improve HRD climate to increase university’s performances.

Table IV summarizes the respondents’ evaluation of employee outcomes at HOU. The respondents agree with the provisions on employee outcomes with 3.81 average weighted mean and standard deviation of 0.79.

Table IV exhibits that the respondents agree with all of the statements particularly as “Development opportunities offered by HOU are beneficial to employee current work” and “Development opportunities offered by HOU are beneficial to employee current work” (WM: 3.94), “The employees lacking of competence in doing their jobs are helped to acquire competence rather than being left unattended” (WM: 3.85), “Employee’s job performances have improved through the application of knowledge and skills acquired through development” (WM: 3.77), “Human relation competencies are adequately developed at HOU through training in human skills” (WM: 3.94), “Development opportunities offered by HOU are beneficial to employee current work” (WM: 3.94), “The employees returning from training are given adequate free time to reflect and plan improvement at HOU”， and “Employee’s job performances have improved through the application of knowledge and skills acquired through development” (WM: 3.77).
“HOU is conductive to any employee interested in developing by acquiring new knowledge and skills through training” and “The employees returning from training are given adequate free time to reflect and plan improvement at HOU.” (WM: 3.69).

The results of Table IV show that the group of respondents perceived that HOU has paid attention to HRD for employees to develop their competences. However, these activities are not sufficient enough to enable the employees to achieve their personal best. Hence, HOU should improve the provisions concerning employees’ outcomes.

Table V presents the respondents’ evaluation of HOU’s outcomes. The respondents have the neutral opinion for all the statements of the provision with the overall weighted mean of 2.74 and standard deviation of 0.77.

As can be seen from Table V, the respondents rate neutral with the statements on “HOU utilizes and benefits from the training programs”, “HOU believes that employee behavior can be changed and people can be developed at any stage of their life” and “Personnel policies within the organization facilitate employee development” (WM: 2.73). Similarly, the respondents have neutral opinion on the statements particularly on “Use of knowledge gained through development activities increases efficiency within Hanoi Open University” and “There is well-designed and widely shared training policy at HOU” (WM: 2.77).

It can be inferred from these results that the respondents think HOU’s outcomes have not effectively resulted from HRD in terms of staff-training policies, development programs. Hence, HOU needs to strengthen these activities to utilize benefits from HRD.

Table VI evaluates neutral for the effectiveness of the other factors concerning HRD practices in terms of technological infrastructure and manpower at HOU with the overall weighted mean of 3.39 and standard deviation of 0.82. The respondents agree with the statements concerning technological infrastructure with the average weighted mean of 3.58 and standard deviation of 0.78 while they rate neutral for the statements referring manpower the average weighted mean of 3.21 and standard deviation of 0.85. This implies that HOU should pay more attention to technological infrastructure and manpower to achieve better performances.

**Table V.** Respondents’ evaluation on HOU’s outcomes resulted from HRD practices

<table>
<thead>
<tr>
<th>HOU’s outcomes</th>
<th>Descriptive statistics</th>
<th>Weighted mean</th>
<th>SD</th>
<th>Descriptive rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q21. HOU utilizes and benefits form the training programs</td>
<td>2.73</td>
<td>0.76</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Q22. Use of knowledge gained through development activities increases efficiency within HOU</td>
<td>2.77</td>
<td>0.75</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Q23. HOU believes that employee behavior can be changed and people can be developed at any stage of their life</td>
<td>2.73</td>
<td>0.79</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Q24. There is well-designed and widely shared training policy at HOU</td>
<td>2.77</td>
<td>0.78</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Q25. Personnel policies within the organization facilitate employee development</td>
<td>2.73</td>
<td>0.78</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Overall weighted mean</td>
<td>2.74</td>
<td>0.77</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

**Table VI.** Respondents’ evaluation of other factors referring to HRD at HOU

<table>
<thead>
<tr>
<th>Other factors</th>
<th>Descriptive statistics</th>
<th>Weighted mean</th>
<th>SD</th>
<th>Descriptive rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q26. HOU has upgraded technological infrastructure for online training</td>
<td>3.58</td>
<td>0.78</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Q27. HOU has put manpower rationally</td>
<td>3.21</td>
<td>0.85</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Overall weighted mean</td>
<td>3.39</td>
<td>0.82</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>
Table VII presents the weighted mean distribution in the respondents’ responses to the survey questionnaire on HRD at HOU. The respondents agree with HRD at HOU with an average weighted mean of 3.43 and standard deviation of 0.81.

As can be seen from Table VII, the overall weighted mean of HRD at HOU is only 3.43, which is not very high. This implies that the current HRD practices at HOU are not efficient enough to bring about university outcomes as high as they are expected. The employee–respondents agree on most of the statements describing HOU’s HRD with the descriptive statistic A (four out of five). The four dimensions of HRD at HOU agreed by the respondents are HRD practices, HRD climate, employee outcomes and other factors with the average weighted means of 3.61, 3.64, 3.81 and 3.39, respectively. However, the respondents have a neutral opinion on the dimension that HRD has significant impacts on university outcomes with the descriptive statistic N (weighted mean rated only 2.74). This shows that the respondents perceive that HOU needs to pay more attention to developing human resources as one of the fundamental factors to enhance the training quality and effectiveness. It can be inferred from the study’s findings that HRD at HOU still has some shortcomings in terms of human resource quality, human resource structure and human resource management.

7. Conclusions and recommendations

7.1 Conclusions

Based on the findings of the study, some conclusions are drawn. First, HRD practices at HOU are not strong enough in terms of providing employees’ career opportunities, developing employees’ capacities and utilizing employees’ potentials. Second, HRD climate referring to supporting employees and building team spirit activities at HOU is not efficient enough. Third, HRD at HOU is not sufficient enough to enable the employees to develop their competences and achieve their personal best. Fourth, HOU has not effectively utilized benefits from HRD in terms of building staff-training policies and implementing staff development programs to gain better performances. Fifth, technological infrastructure and manpower for online training at HOU still need improvement to fully actualize their thrusts.

7.2 Recommendations

Based on the findings and conclusions drawn, the researcher has proposed some recommendations for better implementation for HRD at HOU. First, HOU should build a system of working positions with necessary skills and competences for staff working in open and distance training. It is essential for HOU to develop a plan to train employees working online for each position, providing them with suitable career development, enhancing their capacities and enabling them to achieve their potentials. Second, HOU should create a favorable working environment and build quality culture to inspire the employees to work creatively and effectively. Third, HOU should build adequate policies on recruiting and employing open and distance staff. It is essential for HOU to implement flexible wage policies based on talent

<table>
<thead>
<tr>
<th>Human resource development</th>
<th>Weighted mean</th>
<th>Descriptive statistics</th>
<th>Descriptive rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRD practices</td>
<td>3.61</td>
<td>0.87</td>
<td>A</td>
</tr>
<tr>
<td>HRD climate</td>
<td>3.64</td>
<td>0.84</td>
<td>A</td>
</tr>
<tr>
<td>Employee outcomes</td>
<td>3.81</td>
<td>0.79</td>
<td>A</td>
</tr>
<tr>
<td>University outcomes</td>
<td>2.74</td>
<td>0.77</td>
<td>N</td>
</tr>
<tr>
<td>Other factors</td>
<td>3.39</td>
<td>0.82</td>
<td>A</td>
</tr>
<tr>
<td>Overall weighted mean</td>
<td>3.43</td>
<td>0.81</td>
<td>A</td>
</tr>
</tbody>
</table>

Source: Developed from the survey questionnaire
and contribution efficiency. Besides, opportunities for promotion will appeal and retain more high-qualified employees to contribute to HOU’s performances. Fourth, it is essential for HOU to build and seriously implement the plan to train and foster human resources of open and distance education rationally both in headquarter and in local training centers to enhance their skills and competences dealing with open and distance learners. Last but not least, HOU should hold regular training programs on exploiting technologies in open and distance training for both full-time and part-time staff.

The above-mentioned recommendations are essential for HOU to develop human resources in open and distance education, which requires time and proper investment in all aspects from the very beginning until the human resources are working effectively. HOU is urgently required to undertake the comprehensive and effective measures to develop high-quality human resources for education integration in order to achieve its education development goals.

References
Nadler, Z. and Nadler, L. (2012), Designing Training Programs, Taylor and Francis, Hoboken, NJ.
Zikmund, W.G. (2010), Business Research Method, South-Western Cengage Learning, Mason, OH.

Further reading
Research Instrument

SURVEY FORM FOR EMPLOYEES

TITLE: "Developing human resource for enhancement of training quality and effectiveness at Hanoi Open University"  

EXISTING STATUS OF HUMAN RESOURCES DEVELOPMENT

Please use the scale below to evaluate the existing status of human resources development at Hanoi Open University.

PART I: DEMOGRAPHIC AND WORKING PROFILE OF RESPONDENTS

Please fill-up all the items in this questionnaire and kindly tick the space that corresponds to your answer.

1. Name:  
5. Gender:  
2. Age:  
6. Position:  
3. Profession:  
7. Department:  
4. Highest Educational Attainment:  

Elementary  
High University  
College  
Masters Degree  
Doctoral Degree  
Other Training, please specify  

8. Length of Work Experience:  

Less than one year  
One year to less than two years  
Two years to less than five years  
Five years to less than ten years  
Ten years or more  

PART II: SURVEY QUESTIONNAIRE

A. EXISTING STATUS OF HUMAN RESOURCES DEVELOPMENT

Please use the scale below to evaluate the existing status of human resources development at Hanoi Open University.

DESCRIPTIVE INTERPRETATION

SCALE

5  Strongly Agree (SA)  
4  Agree (A)  
3  Neither Agree nor Disagree (N)  
2  Disagree (D)  
1  Strongly Disagree (SD)  

<table>
<thead>
<tr>
<th>HUMAN RESOURCE DEVELOPMENT PRACTICES</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. The primary objective of the performance appraisal at HOU is mainly to develop employees' capacities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.63</td>
</tr>
<tr>
<td>Q2. Performance appraisal reports are based on objective assessment and adequate information.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.62</td>
</tr>
</tbody>
</table>
Q3. The top management makes efforts to identify and utilize the potential of the employees. 3.60
Q4. Induction training provides an excellent opportunity for newcomers to learn comprehensively about HOU. 3.60
Q5. Job-rotation at HOU facilitates employees’ development. 3.61
Q6. Career opportunities are pointed out to juniors by senior officers at HOU. 3.64

<table>
<thead>
<tr>
<th>HRD Climate</th>
<th>Overall weighted mean of HRD practices 3.61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q7. Seniors guide their juniors and prepare them for future responsibilities/roles they’re likely to take up.</td>
<td>3.51</td>
</tr>
<tr>
<td>Q8. People at HOU are helpful to each other.</td>
<td>3.36</td>
</tr>
<tr>
<td>Q9. The employees are informal and do not hesitate to discuss their personal problems with their supervisors.</td>
<td>3.83</td>
</tr>
<tr>
<td>Q10. People trust each other at HOU.</td>
<td>3.87</td>
</tr>
<tr>
<td>Q11. The employees discuss the problems raised and try to solve them rather than keeping accusing each other behind the back.</td>
<td>3.83</td>
</tr>
<tr>
<td>Q12. Delegation of authority to encourage juniors to develop higher responsibilities is quite common.</td>
<td>3.83</td>
</tr>
<tr>
<td>Q13. Team spirit of high order at HOU.</td>
<td>3.87</td>
</tr>
<tr>
<td>Q14. The employees are encouraged to take initiatives and do things on their own without having to wait for instruction from supervisors.</td>
<td>3.87</td>
</tr>
</tbody>
</table>

| Overall weighted mean of HRD climate | 3.64 |

<table>
<thead>
<tr>
<th>Employee outcomes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q15. The employees lacking of competence in doing their jobs are helped to acquire competence rather than being left unattended.</td>
<td>3.85</td>
</tr>
<tr>
<td>Q16. HOU is conductive to any employee interested in developing by acquiring new knowledge and skills through training.</td>
<td>3.69</td>
</tr>
<tr>
<td>Q17. Employee’s job performances have improved through the application of knowledge and skills acquired through development.</td>
<td>3.77</td>
</tr>
<tr>
<td>Q18. Human relation competencies are adequately developed at HOU through training in human skills.</td>
<td>3.94</td>
</tr>
<tr>
<td>Q19. Development opportunities offered by HOU are beneficial to employee current work.</td>
<td>3.94</td>
</tr>
<tr>
<td>Q20. The employees returning from training are given adequate free time to reflect and plan improvement at HOU.</td>
<td>3.69</td>
</tr>
</tbody>
</table>

| Overall mean of employee outcomes | 3.81 |

<table>
<thead>
<tr>
<th>University outcomes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q21. HOU utilizes and benefits from the training programs.</td>
<td>2.73</td>
</tr>
<tr>
<td>Q22. Use of knowledge gained through development activities increases efficiency within HOU.</td>
<td>2.77</td>
</tr>
<tr>
<td>Q23. HOU believes that employee behavior can be changed and people can be developed at any stage of their life.</td>
<td>2.73</td>
</tr>
<tr>
<td>Q24. There is well-designed and widely-shared training policy at HOU.</td>
<td>2.77</td>
</tr>
<tr>
<td>Q25. Personnel policies within the organization facilitate employee development.</td>
<td>2.73</td>
</tr>
</tbody>
</table>

| Overall mean of university outcomes | 2.74 |

<table>
<thead>
<tr>
<th>Other factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q26. HOU has upgraded technological infrastructure for online training.</td>
<td>3.58</td>
</tr>
<tr>
<td>Q27. HOU has put manpower rationally.</td>
<td>3.21</td>
</tr>
</tbody>
</table>

| Overall mean of other factors | 3.39 |

| Overall mean of HRD | 3.43 |

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