"Fostering the Demand for Quality Teaching and Learning in Higher Education"

Proceedings of the 15th Annual SLAIHEE Conference on Higher Education in Sri Lanka

Jointly organised by

The Staff Development Centre, University of Moratuwa
and
Sri Lanka Association for Improving Higher Education Effectiveness (SLAIHEE)

Friday, 26 July 2019

9.00 am to 4.00 pm

held at

Department of Transport and Logistics Management
University of Moratuwa

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DEDICATION

Dedicated to the ever-reminiscent memory of Dr Shrinika Weerakoon

BSc, MSc, MBA(Perth), DBA (Bath, UK), SEDA Accredited Teacher, ASTHE

- an irreplaceable Higher Educational Developer
- a colleague, a friend, a guide, a change agent: who always found time to be there for you
- who epitomised a life that: “what you leave behind is not what is engraved in stone monuments, but what is woven into the lives of others" (Pericles)

and

- in whose memory SLAIHEE has instituted an annual Award: "Dr Shrinika Weerakoon Memorial Award for the Best Paper in Changing HE student skills”

SDC - SLAIHEE Conference 2019

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15th SDC - SLAIHEE Higher Education Conference

on

"Fostering the Demand for Quality Teaching and Learning in Higher Education"

Friday, 26 July 2019, 9.00 a.m. to 4.00 p.m.

at the Department of Transport and Logistics Management, Faculty of Engineering, University of Moratuwa

(the materials of this conference are available at www.slaihee.org)

A WARM WELCOME TO THE CONFERENCE

This is the fifteenth year since SLAIHEE was established as a non-profit voluntary organisation. From its establishment in 2005, SLAIHEE (Sri Lanka Association for Improving Higher Education Effectiveness) has, jointly with a Staff Development Centre (SDC), organised an annual conference, taking pleasure to provide the only opportunity in Sri Lanka for our university staff to document and discuss the learning enhancements that they have been able to achieve through their subject-related teaching. For the first eleven years, the SDC at the University of Colombo was the organisational partner hosting this annual conference. Then, in its 12th year, the SLAIHEE-SDC conference was hosted by the Staff Development Centre, Wayamba University of Sri Lanka and in the 13th year, was hosted by the Open University of Sri Lanka. Last year, the host became a private HEI, the Sri Lanka Technological Campus with its newly established Centre of Excellence in Teaching, Learning & Innovation (CETLI). This conference has become a Community of Practice and the only national conference in Sri Lanka that focuses exclusively on learning and teaching in the Higher Education (HE) context (SoTL, Scholarship of Teaching and Learning). This year's conference celebrates fifteen years of SLAIHEE and 21 years since the first SDC was established in Sri Lanka (at University of Colombo). Our 21-year history gives us the opportunity to look back and use that experience to question our 'maturity' and where we are, specially with the untimely death of Dr Shrinika Weerakoon who stood, with immense credibility among academics, at the forefront of HE change and improvement in Sri Lanka. She played her role excellently and moved on, much to our disbelief and sorrow. What we will have to say, and do, over the next ten to twenty years is now up to you all and to SLAIHEE. As pioneers in striving to maintain the quality enhancement of HE in Sri Lanka, SLAIHEE has faced and traversed huge challenges and our simple beginnings have enabled us to face these. What challenges the future holds are already palpable, specially with a change in training quality offered at the Colombo University's SDC.

This year's conference theme, "Fostering the Demand for Quality Teaching and Learning in Higher Education" (for previous conference themes and proceedings, see: www.slaihee.org) is relevant because the quality of HE teaching, as well as the quality of training programmes for HE teachers, seem to be severely challenged at present. This theme is therefore meant to gather evidence and show convincingly to others that, with a changed mindset to offer quality training, we can make change happen that all quality-conscious people would value. The conference also shows how we can objectively capture evidence of what some of us achieve in making quality improvements to HE.

We take great pleasure in welcoming you, and our Keynote speaker, Professor Jayadeva Uyangoda.

The conference is of particular interest to all those with a concern and commitment to the quality and fate of future Higher Education in Sri Lanka, including;

- lecturers, managers and administrators in Higher Education
- educational and staff developers
- policy makers

We hope you have an extremely enjoyable experience that will motivate all of us to enhance the quality and usefulness of the higher education experience, mainly to our students.

From the Moratuwa SDC and SLAIHEE – a big thank you;

- for your participation,
- to the presenters, reporting how they overcame challenges to do changes,
- specially to Professor Uyangoda for the Keynote speech,
- to Professor Kapila Perera, Vice-Chancellor of the University of Moratuwa,
- to all the special invitees,
- to the reviewers for their speedy and efficient reviews with helpful feedback.

The Conference Organising Committee;

Dr Thillaiampalam Sivakumar, University of Moratuwa

Professor Suki Ekaratne, SLTC

Dr Prasanna Ratnaweera, The Open University of Sri Lanka

Dr Sunethra Perera, University of Colombo

Dr Jinendra Dissanayake, University of Colombo

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The Conference Papers Committee;

Professor Suki Ekaratne, SLTC

Dr Prasanna Ratnaweera, The Open University of Sri Lanka

Dr Sunethra Perera, University of Colombo

This Proceedings Volume edited by;

Chief Editor: Dr Prasanna Ratnaweera, The Open University of Sri Lanka

Associate Editor: Dr Sunethra Perera, University of Colombo

Assisted by Professor Suki Ekaratne

PROGRAMME

8.30 – 8.55 a.m.: Registration

Session 1 Inauguration [Seminar Hall, Lower Ground Floor, Department of Transport and Logistics Management]

9.00 – 9.05 a.m.: `Housekeeping Announcements'

9.05 – 9.10 a.m.: Welcome address by Dr D.P. Chandrasekara, Director, SDC, University of Moratuwa

9.10 – 9.25 a.m.: Address by Guest of Honour, Professor Kapila Perera, Vice Chancellor, University of Moratuwa

9.25 – 9.35 a.m.: Introduction of "*Dr Shrinika Weerakoon Memorial Award* for the Best Paper in Changing Higher Education Student Skills" by Professor Suki Ekaratne, Founding President, SLAIHEE

9.35 – 9.40 a.m.: Presenting certificates to awardees of '*Dr Shrinika Weerakoon Memorial Award*' - 2018

9.40 – 10.10 a.m.: Keynote Address by Chief Guest, Professor Jayadeva Uyangoda, Emeritus Professor, University of Colombo

10.10 – 10.15 a.m.: Vote of Thanks by Dr T. Sivakumar, President, SLAIHEE

10:15 – 10.45 a.m.: Morning refreshments

Session 2 Parallel Session 1: Hall A (R220, 2nd Floor) & Hall B (R240, 2nd Floor)

11.00 – 12.20 p.m.: Presentations & discussions of peer-reviewed papers

Lunch & SLAIHEE AGM

12:20 p.m.: for SLAIHEE members: lunch followed by SLAIHEE AGM (Seminar Hall)

12:20 p.m.: for non-members – lunch (2nd Floor - Hall A & Hall B)

Session 3 Workshop

1.25 – 2.25 p.m.: Workshop on "How Lecturers change Ways of Thinking and Practice to foster quality Teaching & Learning in Higher Education"; facilitated by the *2018 Dr Shrinika Weerakoon Memorial Awardees*: Ms Abarnah Kirupananda, Ms Prabhashrini Dhanushika, Dr Surangika Ranathunga and Professor Suki Ekaratne

Session 4: Parallel Sessions 2: Hall A & Hall B

2.25 – 3.45 p.m.: Presentations & discussions of peer-reviewed papers

Conference Closure

3.50 p.m.: Filling feedback form & Evening refreshments.

SDC – SLAIHEE Conference, July 26th 2019 - Session Timetable

(page #s refer to pages in Conference Proceedings Book: to plan attending presentations, you can use the 'conference time-planner' on p vii)

Session 2: Paper Presentations		
Session /venue:	Hall A (R220, 2nd Floor)	Hall B (R240, 2nd Floor)
Session Chairs:	Dr Lasith Gunawardena	Dr Jinendra Dissanayake
Time	Paper Title, author(s), page numbers	Paper Title, author(s), page numbers
11.00 – 11.20 a.m.	A 1 – on pp. 1-4 (by) R.M.P.S. Bandara & W.C.D.K. Fernando Use of divergent assessment method to assess computational modelling competencies of engineering undergraduates	B 1 – on pp. 19-22 (by) A. Kurupananda Use of analytic rubrics against holistic rubrics to improve the quality of student answers and marking process
11.20 – 11.40 a.m.	A 2 – on pp. 5-9 (by) S.A. Abayasekara Quality continuous assessment for quality learning amid time constraints: student perceptions, student performance, and teacher observations	B 2 – on pp. 23-27 (by) S. Karunaratne Use of curriculum mapping and gap identification as a framework for quality enhancement of degree programs
11.40 – 12.00 p.m.	A 3 – on pp. 10-14 (by) A. Korala The use of Continuous Assessment linked dialogic feedback to enhance Social Science undergraduates' higher-order skills	B 3 – on pp. 28-31 (by) E.L.S.J. Perera Use of reading groups to overcome reading reluctance and enhance learning skills among Social Sciences undergraduates
12.00 – 12.20 p.m.	A 4 – on pp. 15-18 (by) S.C. Mathugama Effects of Teaching and Assessment Methods on Students' Performance	B 4 – on pp. 32-35 (by) N. Perera Transforming student-centred learning towards bilingual English fluency
12.20 – 1.25 p.m.	SLAIHEE AGM and Lunch	

Session 3: 1.25 – 2.25 p.m.	Workshop “How Lecturers change Ways of Thinking and Practice to foster quality Teaching & Learning in Higher Education"	
Session 4: Paper Presentations		
Session /venue:	Hall A (R220, 2nd Floor)	Hall B (R240, 2nd Floor)
Session Chairs:	Ms Anjali Korala	Ms Ruwani Mayakaduwa
Time	Paper Title, author(s), page numbers	Paper Title, author(s), page numbers
2.25 – 2.45 p.m.	A – 5 on pp. 36-40 (by) J.A.K. Mascranghe An interventional experiment in altering student perception of key study motivation factors	B – 5 on pp. 56-60 (by) R.P. Dharmawardene & T.A. Weerasinghe Increasing improvement in Business English Vocabulary using blended delivery mode compared to online and face-to-face delivery
2.45 – 3.05 p.m.	A – 6 on pp. 41-45 (by) H.M.K. Akalanka Students’ perception and preference towards selected student-centred teaching learning activities: A preliminary study	B – 6 on pp. 61-65 (by) H.G.P.A. Ratnaweera Learner engagement at the pre-laboratory activity and its effectiveness towards successful course completion
3.05 – 3.25 p.m.	A – 7 on pp. 46-50 (by) T. Sivakumar Use of the first five-minute questioning as an Active Learning method for knowledge retention-enabled scaffolded higher learning	B – 7 on pp. 66-70 (by) M. Thenabadu & H.A. Senevirathne Students’ perceptions on educational service quality; Case study at University of Vocational Technology, Sri Lanka
3.25 – 3.45 p.m.	A – 8 on pp. 51-55 (by) W.A.J.S. Wickramasinghe Students’ perception on transformation of a teacher centred undergraduate class to an active learning platform	B – 8 on pp. 71-75 (by) A.D.I. Anushika Empathy as a Tool to Develop Learner Engagement in a Mixed ability ESL Classroom: Student Perceptions

Useful notes and contacts

Conference Time Planner (`A' Sessions at R220, 2nd Floor); `B' Sessions at R240, 2nd Floor)

Time	Session A or B	Paper No. (e.g. 1, 2, 4 etc.)	Pages of paper in book	Title /key words /authors	What aspect I can use in my work or explorer in this paper
11.00 – 11.20 a.m.					
11.20 – 11.40 a.m.					
11.40 – 12.00 p.m.					
12.00 – 12.20 p.m.					
Plans for 12.20 – 1.25 p.m., AGM, lunch	While having lunch, I will `do':				
	Over any spare time, I will `do':				
2.25 – 2.45 p.m.					
2.45 – 3.05 p.m.					
3.05 – 3.25 p.m.					
3.25 – 3.45 p.m.					
3.45 – 4.00 p.m.	Fill feedback form; proceed to tea; meet with contacts. Conference closes with tea.				

Reviewers of papers;

Professor Suki Ekaratne, CETLI – SLTC

Dr Thillaiampalam Sivakumar, University of Moratuwa

Dr Iroja Kaldera, University of Moratuwa

Dr Jinendra Dissanayake, University of Moratuwa

Ms Anjali Korala, University of Colombo

Dr Lasith Gunawardena, University of Sri Jayewardenepura

Dr Sunethra Perera, University of Colombo

Dr Prasanna Ratnaweera, The Open University of Sri Lanka

The paper submission and peer-review process: papers that appear in this Book of Proceedings are in the form of `Full Papers', made up of sections comprised of Background / Purpose (i.e. Introduction), Methodology, Results, Discussion and Conclusions, References. Each paper has been accepted and printed after having undergone a thorough and rigorous peer-review process. In this process, a Short Abstract had first been submitted together with a Self-assessment Scoring Sheet. These abstracts were reviewed by the "Papers Committee", and relevant authors were invited to submit Full Papers. Each `Full Paper' then underwent a double-refereeing process by two independent reviewers who provided referee reports and supportive feedback to be sent to authors justifying acceptance, improvement or rejection of each submission. A third referee was used whenever the first two referees were in disagreement. The reports of both referees were discussed, and the feedback was sent to authors to accept, reject or to do modifications, if any, to the Full Papers as recommended by both referees to meet the 'quality standards'. Authors had the option of not making the changes if they were able to justify why the referee-recommended modifications were not acceptable. Abstracts that were rejected, or not received by the deadline with the recommended modifications, were not 'accepted' and so, do not appear in this Book of Abstracts.

Abstracts plagiarised from others' work, when not acknowledged in the submitted Abstract or have a substantial component of plagiarised material, are in general rejected and followed-up by formally writing to the authors, through their institution heads, as practices that are unacceptable and looked down by the entire academic community worldwide.

All referees and presenters have, in this way, collaboratively contributed to enhancing the quality of Higher Education in our motherland. Even where papers were not accepted, we hope the detailed feedback given would have helped authors to improve their subsequent writing and submissions.

Use of divergent assessment method to assess computational modelling competencies of engineering undergraduates

R.M.P.S. Bandara
Department of Mechanical Engineering, General Sir John Kotelawala Defence University
bandara@kdu.ac.lk
W.C.D.K. Fernando
Department of Civil Engineering, General Sir John Kotelawala Defence University
kumari@kdu.ac.lk

Abstract

Kotelawala Defence University offers an engineering degree programme where computational modelling competencies are inculcated in the final year. They are vital for professional advancement, reinforcing graduates with problem-solving skills to perform confidently after graduation. In the computational fluid dynamics module, the learning outcome: Predict fluid flow around basic flow fronts was assessed through a formative assessment method by giving the same modelling case study to all students. However, it was observed that this wasn't a suitable approach in assessing the said competencies since students produced the same output. Hence, it was explored whether the Divergent Assessment Method, would be effective in assessing the same. Undergraduates in a class of twenty-five were grouped into five-member groups. All groups were assigned to model indoor airflow field of a building which each group was given a different air supply configuration. Groups were allowed to discuss for thirty minutes on the task assigned. Subsequently, each member of a particular group was given a different air supply specification of the same base scenario that was given to the group. Later, groups were dissolved, and students were instructed to complete the assignment by producing model results in a report and to conduct a short presentation, both on an individual basis. Presentations were evaluated with oral questions and the reports were returned to them with feedback. It was observed that each student produced a unique set of modelling results, as per individually assigned inputs. They had also gained sufficient insight into computational modelling, as evaluated by oral questions. Overall success was reflected by a minimum 10% increase of marks obtained for the report compared with the exiting mode of assessment. The study showed that computational modelling competencies of engineering undergraduates can be assessed successfully by using the Divergent Assessment Method.

Purpose

Possession of problem-solving skills is a key aspect as far as the career of an engineer is concerned. The said competencies contribute to professional advancement, reinforcing graduates with the ability to solve real-life problems while inculcating self-confidence to perform successfully in their professional life. Problem-solving skills have been given high priority by the Institution of Engineers Sri Lanka (IESL, 2014), by making this graduate attribute a requirement to be fulfilled by engineering degree programmes that seek its recognition. Problem-solving skills in engineering can be divided into three categories as analytical skills, numerical/computational skills and experimental skills (Tu, Yeoh, & Liu, 2008). Among the numerical/computational skills, computational modelling competencies are essential to solve real-life problems in engineering such as industrial fluid dynamics, aerodynamics,

hydrodynamics, heat and mass transfer, combustion etc.

General Sir John Kotelawala Defence University produces engineering graduates mainly for the Sri Lankan armed forces. The undergraduate students study Computational Fluid Dynamics, as a core module in the final year of the engineering degree programme. In this module, students are expected to apply computational aspects to model, design and optimise engineering systems by building on prior knowledge acquired during previous years. The module comprises of five learning outcomes and the learning outcome: Predict fluid flow around basic flow fronts is assessed through a formative assessment using the case study approach. When students are assessed, the general practice had been to give the same modelling case study to all students with necessary instructions to perform the task. Subsequently, all students produced the same output as instructed. However, it was observed that this approach often hindered acquiring computational modelling competencies among undergraduates and eventually showed the poor accomplishment of the learning outcome. Furthermore, students tend to copy from their peers since they have been given the same modelling case study. In this context, it was evident that this assessment method was not appropriate to assess computational modelling competencies. Hence, it was explored whether the Divergent Assessment Method would be a better method of assessment of the said competency.

Boud (1995) argued that assessment methods can have a greater influence on how and what students learn than any other single factor. This influence may well be of greater importance than the impact of teaching materials. As per the conceptual framework of formative assessment proposed by Torrance and Pryor (1998), two types of assessment modes exist; convergent assessment and divergent assessment. In convergent assessment students are involved as recipients in the assessment process (Shuichi, 2016). Its purpose is to discover whether the learner knows, understands or can do a predetermined task (Torrance & Pryor, 1998, p. 153). Hence, the convergent assessment focuses only on whether students can perform and complete a specific task as required. It relates to normative criteria with the primary concern on the curriculum (Pryor & Crossouard, 2010).

In divergent assessment students are involved as initiators (Shuichi, 2016). It aims to discover what the learner knows, understands or can perform (Torrance & Pryor, 1998, p. 153). Divergent assessment involves a more open engagement with what the student can do, focusing on the learner's agenda with a more dialogic, conversational form of language (Pryor & Crossouard, 2010). This is characterised by (adapted from Torrance & Pryor, 1998):

- Flexible or complex planning which allows deviation from plan
- More open forms of recording/noting learning (narrative, quotations etc.)
- More open and ongoing tasks
- Provisional or probing feedback during the task with a metacognitive edge
- Involvement of the learners as participants in assessments
- Learning seen as complex, multifaceted and occasionally surprising
- Classroom talk is at times more like conversation, debate and even dialogue

Biggs and Tang (2007) is of the view that all university-level modules require at least some divergent assessment.

Methodology

Undergraduates in a class of twenty-five were grouped into five-member groups. All groups were assigned to model the indoor flow field of a building while each group was given a different air supply configuration. Groups were allowed to discuss for thirty minutes on the task assigned. Subsequently, each member of a particular group was given different supply air specifications of the same base scenario given to the group. Later, groups were dissolved, and students were instructed to complete the case study by producing model results in a report and to conduct a short presentation both on an individual basis. The criterion used to assess the report is given in Table 1; this was given to the students in advance. They were given the freedom to choose different turbulence and radiation models in the respective computational models. Moreover, students were motivated to experiment with different resolutions of the computational mesh and to observe how this would affect the solution generated for indoor flow field of the building. Presentations were evaluated with oral questions posed by both the lecturer and peers. Reports were returned to the students with feedback.

Table 1. *Assessment criterion for evaluating the case study report*

Criterion	Aspects considered	Level in SOLO Taxonomy	Allocation of Marks (%)
1	Create geometrical model of the building	Extended Abstract	20
2	Generate computational mesh	Extended Abstract	20
3	Apply boundary conditions	Relational	15
4	Select flow physics	Relational	15
5	Interpret modelling results	Extended Abstract	30

Results

It was observed that students had produced a unique set of modelling results, based on individually assigned supply air specifications. They had also gained sufficient insight into computational modelling, as evaluated by oral questions during presentations. A typical modelling result produced by students is shown in Figure 1.

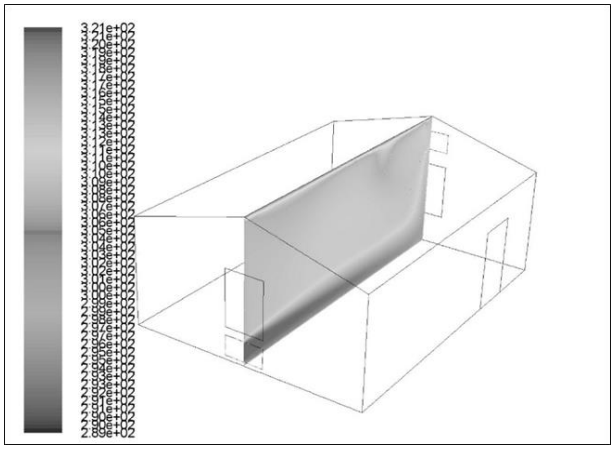


*Figure 1***.** Sample modelling results of indoor air temperature

Table 2 compares the average mark received by students for the case studies assessed based on the two approaches. It is observed that with the Divergent Assessment Method a minimum 10% increase was observed.

Table 2**.** *Average marks obtained for the case study report*

Group No.	1	2	3	4	5
Existing assessment approach	55	66	59	62	60
Divergent assessment approach	64	74	68	70	66
Increase in marks (%)	16.4	12.1	15.3	12.9	10.0

Discussion and Conclusions

The study showed that computational modelling competencies of engineering undergraduates can be assessed successfully by using the Divergent Assessment Method. Students showed a notable improvement on the competencies related to computational modelling and hence the respective learning outcome was accomplished with a change in the assessment mode. Notable improvements were observed at the Extended Abstract level of the SOLO Taxonomy. This was reflected by a minimum 10% increase of marks obtained for the report compared with the previous method of assessment. Furthermore, copying from peers and senior students was completely eliminated with this effort since each student was assigned with a unique set of air supply specifications. This strategy can be further extended to design, model and optimise other engineering systems as well. The competencies gained by students will be highly beneficial when they graduate as commissioned military engineers enabling them to apply the same to design and optimise real-life engineering systems.

References

Biggs, J., & Tang, C. (2007). *Teaching for quality learning at university* (3rd ed.). Berkshire, England: The Society for Research into Higher Education and Open University Press.

Boud, D. (1995). *Enhancing learning through self-assessment*. London, England: Kogan Page.

IESL (2014). *Manual for recognition of four-year engineering degrees conducted in Sri Lanka*. Institution of Engineers Sri Lanka, Colombo.

Pryor, J., & Crossouard, B. (2010). Challenging formative assessment: disciplinary spaces and identities. *Assessment & Evaluation in Higher Education*, 35(3), 265-276.

Shuichi, N. (2016). The Possibilities and limitations of assessment for learning: Exploring the theory of formative assessment and the notion of “Closing the learning gap”. *Educational Studies in Japan: International Yearbook*, 10, 79-91.

Torrance, H., & Pryor, J. (1998). *Investigating formative assessment: teaching, learning, and assessment in the classroom.* Buckingham, England: Open University Press.

Tu, J., Yeoh, G., & Liu, C. (2008). *Computational fluid dynamics: A practical approach*. Oxford, England: Butterworth-Heinemann.

Quality continuous assessment for quality learning amid time constraints: student perceptions, student performance, and teacher observations[1]

S.A. Abayasekara
Department of English, University of Colombo
shalini@english.cmb.ac.lk

Abstract

Quality learning comprises both engagement with and enjoyment of the learning process. Assessment plays a significant role in enhancing the quality of a degree programme's outcomes and ideal evaluation systems are structured with student benefit in mind, where developing applicable skills and knowledge is emphasised. However, a challenge for students regarding assessment is time constraints, particularly when neither assessment scheme nor number of notional hours can be changed based on the duration of a semester. The question then becomes how one can ensure a quality assessment process amid time constraints. I implemented a change in the Continuous Assessment (CA) scheme for the course *Rhetoric and Style*, examining its effectiveness in enhancing assessment in a relatively short semester. While the course description specifies three assessments, rather than focusing on three separate topics, students (n=3) did three interrelated assessments - posts on the Learning Management System, an argumentative essay, and a panel discussion. I then gauged the success of this intervention through student feedback, student performance, and self-observation. Student feedback indicated that the scheme was successful overall, with mention of the CAs having been enjoyable and having caused no pressure due to time factors. Class performance indicated that primarily having one topic which was built on throughout the semester could enable effective development in a key area even within time limitations. The benefit of this uniformity is reflected in the final CA where student performance from assessment 1 to 3 increased on average by 16%. However, unsurprisingly, low attendance and motivation adversely affected engagement with CAs. Areas for improvement also existed such as clearer guidelines and a more carefully thought-out marking criterion. This revision indicates that if suitably adapted, an assessment strategy with an interlinked scheme can make evaluation both meaningful and enjoyable, thereby enhancing a pivotal aspect of successful, quality learning.

Background

The concept of quality learning could be viewed through multiple angles. Meyerson (2016) notes that it provides students with skills to navigate knowledge, is founded on executive or soft skills, emphasises active construction of learning, is cumulative, gives students control

[1] This paper is an extension of a seminar presentation done as partial requirement for the Certificate in Teaching Higher Education (CTHE) course, based on a course Learning Agreement (LA) and titled *Battling against time: Assessment in a 12-week semester*. Thus, I acknowledge the guidance given by my CTHE mentor Prof. Dushyanthi Mendis and another senior colleague Dr Kaushalya Perera in the compilation of the initial LA.

over their own learning, enables students to fail and then learn from those failures, and promotes collaboration. Smith (2013) in turn highlights enjoyment as a key feature of successful scholarship. Thus, one could say the pedagogical process comprises both meaningful engagement with lesson material as well as enjoyment of the experience.

Nonetheless, whereas assessment is an integral part of the process, it is often not seen as enjoyable from either student or lecturer perspective. For the student, evaluation could induce stress and anxiety, while for the lecturer, setting and grading assessments could carry their own challenges. This issue becomes particularly pertinent when a semester is shortened but evaluation schemes cannot be revised accordingly due to university-wide policies. In attempting to estimate what an appropriate workload for students might be, Barre (2016) notes that students generally take approximately three times longer than educators would, to complete an assignment or exam. If educators ignore this factor, students could be overburdened, leading to surface level learning (Biggs & Tang, 2007).

This paper examines steps taken to avoid a situation of overburdening due to time factors. The course *Rhetoric and style* would I felt be problematic during a particular semester where the duration was shortened from 15 to 12 weeks, and the course description specified three assessments instead of the general two – assessment 1 (10%), assessment 2 (10%), and group project (25%). There was the added challenge of the class being comprised only of three students, and two of these three being known for poor attendance.

Methodology

In order to maintain quality and stipulated quantity, the scheme was revised so that while the number of assessments remained the same their original topics of focus changed. Formerly the assessment topics had been on three separate areas but now had some uniformity. Assessment 1 utilised the Learning Management System (LMS), with students having to make four posts on LMS, on topics of interest. Each post was marked out of 10 and then averaged to obtain a single mark out of 10. To ensure engagement with others' work as well as a sufficiently wide exposure to rhetorical analysis, I also required them to comment on another's post. Assessment 2 was an argumentative essay written developing a topic covered in one of the LMS posts. Finally, assessment 3 was a panel discussion developing the topic chosen for the argumentative essay. In this manner, there was a common thread across all three assessments (at least one LMS post being related to the other two assessments), with each building on the former. The scheme's degree of success was evaluated through self-observations, student feedback, and student performance.

In terms of time management, I felt this scheme would be effective for several reasons. As the students had to pick a main topic for the semester, though the semester was short, they would still develop extensively in a chosen sphere. On the other hand, the multiple LMS posts and engagement with others' posts would provide exposure to areas not explored in the essay and panel discussion. The assessments' diverse nature also meant that students engaged with material multimodally, something integral to the study of rhetoric and style.

Results and discussion

LMS posts – In terms of reaching Intended Learning Outcomes (ILOs), the LMS posts were quite successful. Students engaged with multiple aspects of the post's rhetorics, including the

audiovisual, with their experimentation covering documentaries, advertisements, twitter posts, and songs. Though they had initially not realised the extent to which they had to analyse the content, the issue was rectified through my extensive feedback on post 1. Central to this scheme was minimising time-related stress. Along with the observation about limited analysis, it became clear that it took longer than expected for students to reach my expectations, similar to what Barre (2016) posits. I also felt this level of analysis would require a longer post than formerly specified. I thus changed the number of posts from four to three and conveyed that I expected more from each post. This change led to significant improvement from post 1 to 2 in two students, reflected in their marks (see Table 2).

Argumentative essay – As indicated, the essay component of the course had to be closely linked to one of the LMS posts. Student A who was very keen from the outset specifically asked if I could give her feedback on her post before she submitted her essay and posted it in time. Her essay was quite strong overall, and I could see genuine effort to incorporate elements of rhetoric and style discussed in the class. Students B and C, however, did not aim for my feedback. B submitted the essay the day after making the post, and C wrote on a completely new topic. This disregard could spring from issues in time management as well as attendance and motivation, factors to consider particularly in a scheme where engagement with one assessment may significantly impact performance on the other. Moreover, the writing skills required for the assessment could have impeded their performance (see Table 1 for marks).

Panel discussion – The panel discussion was very successful, with students even making their own suggestions as to how it could be held. Though C had disregarded important guidelines when writing her essay - and the situation was further complicated as the topic chosen was not an arguable one - the topic of one of her LMS posts was suitable for the panel discussion, a point she herself realised and utilised. Though not up to the standard I would have liked her performance to be, it was not a failure, and the other two students had incorporated my feedback to a large extent, all of which together formed an insightful and absorbing panel.

Student feedback – As this scheme was targeted towards alleviating student stress regarding evaluation amid time constraints it was imperative to get student feedback on the same. Only A was present during end-of-semester evaluations and stated having found the assessments interesting, well-organised, and well-paced. To obtain B and C's views, I subsequently requested all three students to share their thoughts, especially regarding the time factor. A and B responded, and the questions and answers most pertinent to the paper are given below.

Questions

1. What did you like most about the assessment scheme?
2. What did you dislike most about the assessment scheme?
3. How did you find handling three CAs during the semester (e.g. easy, difficult, somewhat easy/difficult)? Please give reasons for your answer.

Discussion of answers

Both students noted that they liked the element of choice in topic, with, A specifically mentioning the assessments' interlinked nature. She noted that she did not dislike any part

of the scheme and appreciated the testing of many skills such as analysis, critical thinking, persuasive writing, and persuasive speech. B noted that she had felt the assessment guidelines lacked clarity at times, but that there had been only mild confusion.

Question 3, directly targeting the issue of time limitations, elicited the following responses:

A: Somewhat easy, because the assessments were spaced out well, providing us ample time to complete one successfully before moving on to the other. The fact that they were also interesting ones to work on made it easier. However, it did keep us occupied throughout the semester meaning it wasn't very light. But, I guess that's how it should be!

B: Somewhat difficult. The variety of the tasks were challenging but it was also engaging and interesting which made it likable for the student.

Both students state having found the assessments engaging, with A again noting the sensitivity of the spacing to student needs. While B may have faced difficulty due to exams elsewhere at the time, her response also demands consideration of instances where I would perhaps need to rethink the variety of tasks I set, if for instance the semester got further shortened or the class size significantly increased, affecting individual attention given. Nevertheless, maintaining quality and standards is also necessary, especially considering students' inevitable challenges in pedagogical, professional, and personal contexts.

Student performance – Finally, student performance indicated the possible effect of the assessment scheme. The following were the marks for the post on the common topic, essay, and panel discussion.

Table 1**.** *Marks for assessments on a common topic*

Student	LMS post (10%)	Essay (10%)	Panel Discussion		Total mark for CAs (45%)
			Raw mark (25%)	Mark prorated to 10% for comparison	
A	6.50	6.75	18.50	7.40	31.75
B	5.50	4.00	16.75	6.70	26.25
C	2.50	2.50	13.00	5.20	18.00

The above marks show a 16% increase on average from assessment 1 to assessment 3. Indeed, one cannot say definitively that the common thread in the assessment scheme helped the student perform better; the improvement could be partly explained by the diverse skills required by the different assessments and the student's level of skill in that area. Still one cannot completely disregard the possible effect of in-depth focus on a topic. Moreover, working on the same topic multimodally would have enabled students to identify which assessment strategies they did not find daunting and which required improvement. Interestingly, however, one does not see a clear development across all three LMS posts.

Table 2**.** *Marks for LMS posts (10 marks per post)*

Student	LMS post 1	LMS post 2	LMS post 3
A	6.50	9.00	8.25
B	5.50	8.50	7.00
C	2.50	2.50	2.00

As mentioned previously, A and B's marks increase from post 1 to 2 but then drop. C's marks remain the same and then drop. While, again, this pattern could spring from many reasons, one of them could pertain to the topic. As the individual posts deal with widely varying topics, each new post becomes yet another area to explore. Therefore, the exact design of the postings needs to be considered when implementing the scheme in the future.

Conclusions

Having a single topic developed over the course of a semester may be one effective strategy for ensuring quality evaluation amid time constraints. Yet factors such as assessment type, spacing, and degree of choice, alongside secondary but still pertinent factors such as class size, attendance, and motivation, need to be considered for future application. For instance, though the number of students here was small, the concept of uniformity across assessments could be used for larger classes if suitably adapted. Students could make two LMS posts instead of three, make shorter posts, and discuss the posts in groups if time does not permit overall class discussions of each post. Attendance and motivation could be encouraged by evaluating these in-class discussions of posts. As Gibbs and Habeshaw (1989/2011) note, assessment drives students, and used with care, can direct energy to key areas of learning. By making assessment meaningful and pleasurable even amid temporal challenge, one can thus enhance an essential ingredient of successful, quality education.

References

Barre, E. (2016). How Much Should We Assign? Estimating Out of Class Workload. Rice Center for Teaching Excellence, Retrieved September 30, 2018, from https://cte.rice.edu/blogarchive/2016/07/11/workload.

Biggs, J. B., & Tang, C. (2007). Teaching for quality learning at university: what the student does (3rd ed.). New York, NY: The Society for Research into Higher Education & Open University Press.

Gibbs, G., & Habeshaw, T. (1989). Preparing to teach: an introduction to effective teaching in higher education. Bristol, England: Technical & Educational Services, [e-book PDF file prepared by Stephen Bostock – 2011].

Meyerson, D. (2016). What does quality learning mean to you? Criterion Conferences. Retrieved March 25, 2019, from https://www.criterionconferences.com/blog/education/quality-learning-mean/.

Smith, C. A. (2013). What does high quality learning mean? ResearchGate. Retrieved 25 March, 2019, from https://www.researchgate.net/post/What_does_high_quality_learning_mean.

The use of Continuous Assessment linked dialogic feedback to enhance Social Science undergraduates' higher-order skills

A. Korala
Department of Political Science and Public Policy, University of Colombo
anjalikorala@gmail.com

Abstract

Over three years, written individual feedback was provided in mid-semester evaluations through separate forms. However, this did not showcase any advancement in students' higher-order skills (e.g. analytical skills), as it was observed that in final exams a majority of the answers still demonstrated lower-order skills (e.g. descriptive). Single-instance feedback also did not provide the opportunity to monitor how they enhanced their skills based on the feedback received. As a solution, a continuous assessment and feedback method was initiated through tutorials in a class of eleven students. The first tutorial answer was individually assessed based on Bloom's taxonomy to identify the level of learning of the student. The mistakes in each answer were marked on the answer script and, after returning them to students, the mistakes were discussed extensively in class. Mistakes made in the first and second answers were compared, and relevant statistics computed. The first tutorial was based on the conceptual aspect of the lesson while the second focused more on the practical implications of the concepts taught. The comparison showcased that by the second answer, 18.1% (2 students) who were in the Lower Order Thinking Skills (LOTS) had reached the 'apply' and 'analyse' levels in the Higher Order Thinking Skills (HOTS) by marking a zero percent for the LOTS. 36.3% (4 students) were able to enhance their skills into the 'evaluate' and 'create' levels of the HOTS. Further, other mistakes ('lack of connection' (LC), 'mistaken facts (MF)' and 'facts out of order' (FOO)) identified in the first answer were no longer evident in the second. The study showcased that individual identification and discussing feedback on mistakes in students' answers enabled students to identify their mistakes accurately, facilitating their correction. Therefore, the semester-based continuous assessment, when linked to dialogic feedback, can benefit students most effectively in enhancing higher-order skills.

Background

In a rapidly changing market-oriented world, what society expects from higher education institutions has changed. The society and especially the market are expecting higher education institutions to produce more 'employable graduates', who are equipped with the necessary knowledge and skills to face the changing market forces (Harvey, 2003). These skills are usually known as the 'Higher Order Thinking' skills (HOTs). These newest expectations of knowledge and skills have changed the role of the teacher as well. According to Donald (1985), previously the teachers were supposed to review, present and critically evaluate the knowledge in their relevant subject field, while now they are expected to think beyond this paradigm and try to produce a synthesis and teach the students strategies on how to organise the knowledge. Furthermore, referring to Piaget (1972), Donald (1985) argues that most of the time the intellectual skills which higher education institutions wish to cultivate in their undergraduates are mostly subject related, and if a teacher wishes to cultivate such skills, s/he has to understand the type of intellectual skills the subject expects to cultivate. For

instance, the intellectual skills to be cultivated by the Natural Sciences and the Social Sciences are different from each other. Therefore, the teacher should also pay special attention on the 'discipline-specific pedagogical knowledge' (Berthiaume, 2009).

In the field of Political Science, students are expected to analyse (and later apply) real-life political incidents using the theories and concepts which they learn during their higher education. Therefore, classroom activities such as learning, teaching, and evaluations, should be planned in order to facilitate these Higher Order Thinking skills while acquiring the subject relevant knowledge. For instance, one becomes a political scientist if s/he knows how to apply the relevant theories and concepts to identify and analyse the anomalies in politics. This involves the process of learning and being shifted from teacher-centred learning to a student-centred one. But this shift does not mean that the teacher should not be engaged in the learning process to support the student other than acting as the teacher. The teacher should provide feedback constantly for the student to improve their skills. Furthermore, according to Ivre (1998), as cited in Yen and Halili (2015), teachers are entrusted with the responsibility of facilitating an environment conducive for higher-level thoughts inside the class, as well as within the cognitive practices and tendencies of the students. This indicates that the responsibility of the teacher extends beyond the mere teaching activity, but also to the level of keeping the skills of the student sustainable (Martin 2009).

For the past three years, various methods were used to provide feedback to students intending in order to improve their Higher Order Thinking skills such as (1) guiding students on how to organise the facts through rubrics and providing single-instance individual feedback to improve themselves and (2) guiding students on how to build up arguments by assembling the facts according to rubrics and providing single-instance individual feedback to improve themselves. It was expected that the students would improve their Higher Order Thinking skills by incorporating such feedback and would perform better at the end semester examinations. Nevertheless, neither of these methods proved successful as the students' answers at the final examination were still more descriptive than analytical. Therefore, without continuing the single-instance feedback method, the students were asked to write tutorials for each lesson and feedback was provided continuously on an individual basis. Through this method, it was intended to identify individual mistakes of each student, provide feedback individually and monitor their progress on enhancing the higher-order thinking skills.

Methodology

This research was conducted with a tutorial class of 11 students. Students were given a past-paper question to write a tutorial answer on. During this first attempt, the students were not guided by the lecturer. Through the first tutorial answer, it was intended to find the mistakes made by each student, so the lecturer can map the mistakes on an individual basis. These mistakes identified through the first tutorial answer were used to create the rubric. The rubric consisted of three main parts; introduction, content, and conclusion. The content part was again divided into four parts; three of them using the levels mentioned in Bloom's taxonomy, and the fourth part on common mistakes. The rubric made based on the mistakes observed in student tutorials is as follows.

Each mistake of each student was marked in their tutorial answer. During the tutorial class, these mistakes were discussed at length. Since the mistakes were marked in students' tutorial answers, they were able to look through the mistakes again and request explanations to improve themselves. In the second tutorial, the same rubric was used to evaluate the answers, and the mistakes of each student made in this tutorial answer were compared with their first tutorial answer.

Table 1. *Evaluation Rubric*

<table>
<tr><td>Introduction</td><td colspan="3">Unnecessary information (UI)
Lack of logical connection (LLC)</td></tr>
<tr><td rowspan="9">Content</td><td rowspan="2">Level 1</td><td>Knowledge</td><td rowspan="5">Bloom's Taxonomy</td></tr>
<tr><td>Understand</td></tr>
<tr><td rowspan="2">Level 2</td><td>Apply</td></tr>
<tr><td>Analyse</td></tr>
<tr><td rowspan="2">Level 3</td><td>Evaluate</td></tr>
<tr><td>Create</td></tr>
<tr><td rowspan="4">Other mistakes</td><td>Mistaken facts (MF)</td><td rowspan="4"></td></tr>
<tr><td>Lack of connection (LC)</td></tr>
<tr><td>Facts out of order (FOO)</td></tr>
<tr><td>Missing facts in the text (MFT)</td></tr>
<tr><td rowspan="3">Conclusion</td><td>Level 1</td><td colspan="2">Provides a simple conclusion</td></tr>
<tr><td>Level 2</td><td colspan="2">Provides a conclusion with an explanation</td></tr>
<tr><td>Level 3</td><td colspan="2">Provides a conclusion with personal recommendations for improvements</td></tr>
</table>

Results

The mistakes made by the students in the first tutorial answer were visibly reduced in the second tutorial answer. The 'other mistakes' identified in the content part of the first tutorial answer had also reduced considerably. Comparatively, the students showcased progress in their answers. In the first tutorial answer, under the introduction part, 18.1% of students (2 students) had written unnecessary information (UI), and some facts they had presented were not logically connected to the answer. By the second tutorial answer, this mistake of 'unnecessary information' was reduced to one student, but the lack of logical connection (LLC) in the introduction part stayed the same.

When it comes to the content part, mistakes marked in the first tutorial showed that 2 students were on the 'describe' and 'explain' levels of Bloom's taxonomy. 72.2% of the students (8 students) were on the 'apply' and 'analyse' levels of Bloom's taxonomy. Only 1 student was on the 'evaluate' and 'create' levels of Bloom's taxonomy. Moreover, in some answers the facts were not organised in a coherent order, some students had written mistaken facts in their answers, and some students had missed important facts necessary for the answer. In the second tutorial answer, the 18.1% (2 students) students who were on the 'describe' and 'explain' levels of Bloom's taxonomy earlier, had shifted to the 'apply' and 'analyse' levels of Bloom's taxonomy. The 9% (1 student) who were on the 'evaluate' and

'create' levels of Bloom's taxonomy the first time around, had increased to 36.3% (4 students) by the second tutorial answer.

Table 2**.** *Mistakes made in the first tutorial answer and second tutorial answer*

Section	Sub-section	Answer 1		Answer 2	
		No. of Students	Percentage	No. of Students	Percentage
Introduction	LLC	2	18.1	2	18.1
	UI	2	18.1	1	9.0
Content	Level 1	2	18.1	0	0.0
	Level 2	8	72.7	7	63.6
	Level 3	1	9.0	4	36.3
	LC	1	9.0	0	0.0
	MFT	6	54.0	1	9.0
	FOO	0	0.0	0	0.0
	MF	1	9.0	0	0.0
Conclusion	Level 1	9	81.8	8	72.7
	Level 2	2	18.1	1	9.0
	Level 3	0	0.0	2	18.1

In the first tutorial answer, 81.8% (9 students) were on level 1 of the conclusion part, which amounted to providing a simple conclusion. 18.1% (2 students) were on level 2 of the conclusion part, and there were no students on level 3 in this regard. When it came to the second tutorial answer, level 1 students were reduced to 72.7% (8 students) and level 2 students were reduced to 9% (1 student), while level 3 was increased to 18.1% (2 students).

Discussion and Conclusions

Evaluating and improving students' Higher Order Thinking skills have always been a challenging task in higher education. This is due to the fact that the way of applying these skills differs from discipline to discipline. In this research, it was evident that providing dialogic feedback to students in a continuous manner was an effective method in improving students' Higher Order Thinking Skills. To this end, preparing a rubric based on the most common mistakes of students was helpful to further identify repetitive mistakes. This allowed the lecturer to accurately work on addressing mistakes and providing feedback individually. After the second tutorial answer, it was evident that minor mistakes such as 'lack of connection', 'mistaken facts' and 'facts out of order' were corrected by the students and the students had upgraded their analytical skills. It was evident that continuous feedback on the students' skills development leads to the gradual development of the students' analytical skills. Zohar's (2013) attempt on identifying the different dimensions of HOTs can be shown as one of the perspectives which the teacher can adopt as a base of providing feedback to the students on developing their HOTs. According to Zohar (2013), the HOTs can be explained with 'the knowledge to teach thinking' and 'knowledge of elements of thinking' along with four main sub-categories; (1) knowledge of individual thinking strategies – making comparisons, formulating justified answers and drawing valid conclusions; (2) knowledge of genre of thinking – argumentation, inquiry learning, problem-solving, critical thinking, scientific

thinking, and creative thinking; (3) knowledge of metacognition – thinking about own learning and (4) knowledge of additional issues – thinking dispositions (habits of mind) and culture of thinking. Creating teaching, learning, and evaluation activities according to these guidelines can be beneficial to the teacher as well, as it gives a clear perspective on how to organise the feedback which s/he provides the students. Although carrying out these described teaching activities was more convenient due to smaller class size in this instance, an urgent need is present to adapt these methods to improving Higher Education quality in larger classes also.

References

Berthiaume, D. (2009). Teaching in the Disciplines. In H. Fry, S. Ketteridge & S. Marshall (Eds.) *A Handbook for Teaching and Learning in Higher Education – Enhancing Academic Practice* (3rd Ed.), 215-225. New York, NY: Routledge.

Donald, J. G. (1985). Intellectual Skills in Higher Education. *The Canadian Journal of Higher Education,* (15)1, 53-68.

Harvey, L. (2003). Transitions from Higher Education to Work (briefing paper). Centre for Research and Evaluation, Sheffield Hallam University, Sheffield, UK.

Martin, P. W. (2009). Key Aspects of Teaching and Learning in Arts, Humanities and Social Sciences. In H. Fry, S. Ketteridge & S. Marshall (Eds.) *A Handbook for Teaching and Learning in Higher Education – Enhancing Academic Practice* (3rd Ed.) 300-322. New York, NY: Routledge.

Yen, T. S., & Halili S. H. (2015). Effective Education of Higher Order Thinking (HOT) in Education. *The Online Journal of Distance Education and e-learning,* 3(2), 41-47.

Zohar, A. (2013). Challenges in Wide Scale Implementation Efforts to Foster Higher Order Thinking (HOT) in Science Education Across a Whole School System. *Thinking Skills and Creativity,* 10, 233-249.

Effects of Teaching and Assessment Methods on Students' Performance

S.C. Mathugama
Division of Interdisciplinary Studies, Institute of Technology, University of Moratuwa
mathugama@yahoo.com

Abstract

The year 2018 was very important for the National Diploma in Technology (NDT) Programme and for the Institute of Technology, University of Moratuwa (ITUM) as the ITUM had introduced the semester system. The main objective of this study is to analyse students' performances in Continuous Assessments (CA) and Final Examination (FE) of Mathematics modules. During Semester 1, mid-semester test was conducted; results of the said test and the Final Examination for the Calculus section of the Mathematics module were compared. During Semester 2, different teaching methods were used in the Numerical Methods section, and the effect of these methods on the FE was were analysed. For the Calculus section, nearly 20 per cent scored below 40 per cent mark and 43 per cent scored over 70 per cent during the mid-semester test. Students were informed of the LOs they have not achieved, with the common mistakes done. In the FE, two questions were given on Calculus; for Question 1, around 9 per cent scored below 40 per cent and around 69 per cent scored over 70 per cent. For Question 2, the respective percentages were 15 per cent and 48 per cent. During Semester 2, for Numerical Methods around 9 per cent scored below 40 per cent and 62 per cent scored over 70 per cent. Even though lecture notes were uploaded to LMS MOODLE, printed handouts of the same were circulated. However, many students had accessed the PowerPoint presentations via MOODLE and this was evident by the responses given by them. Feedback given on the mid-semester tests was helpful to improve their performance at Semester 1 FE. Teaching methods used in Semester 2 had a positive impact on their performance at the FE.

Background

The year 2018 was very important for the National Diploma in Technology Programme and for the Institute of Technology, University of Moratuwa as it had introduced the semester system. The continuous assessment was introduced with new teaching and assessment methods and the final examination was held towards the end of the semester.

The continuous assessment gives continuous feedback on student learning and the assessments help students to assess their knowledge and use the feedback received to correct their mistakes and misconceptions in constructing new knowledge. Assessments well designed and executed improve learning among students and they also help to develop life-long learning skills (Gibbs & Habeshaw, 1997; Brown & Smith, 1999). If the only assessment method is the final examination, students miss the opportunity to learn from feedback (Biggs, 1999).

Mathematics and Statistics (IS1104) and Mathematical Methods with Engineering Applications (IS1204) were offered in semesters 1 and 2, respectively, during 2018. The sections Calculus and Numerical Methods were offered in IS1104 and IS1204, respectively. The main objectives of this study were to (a) analyse student performance in Continuous Assessments (CAs) and the Final Examination (FE) in the Calculus Section; (b) analyse the

effect of teaching methods used on student performance in the Numerical Methods Section

Methodology

The Learning Outcomes (LOs) in the Calculus section of the Semester 1 course were assessed based on the mid-term and the Final Examination test scores. The mid-term test was administered to two student groups. Their performance at the mid-term test was assessed based on two LOs covering five aspects. The LOs for the Numerical Methods section were assessed based on the FE test scores. In this regard, the effectiveness of the use of LMS MOODLE, the use of handouts, uploaded power-point presentations, and the use of MATLAB for learning activities was evaluated.

Four out of the twelve Programme Outcomes (POs) were mapped to three Learning Outcomes (LOs) of the Calculus Section (i.e. LO1 to LO3) and three LOs of the Numerical Methods Section (i.e. LO4 to LO6) (refer Table 1).

Table 1. *Mapping of Program Outcomes (POs) with Learning Outcomes (LOs) of Calculus and Numerical Methods sections*

Learning Outcomes	POs assessed in the two sections			
	PO 1 -Engineering Knowledge	PO 2-Problem Analysis	PO 5 -Modern Tool Usage	PO 6-The Engineer and Society
LO1- Identify basic concepts of Mathematics and Statistics	CA			
LO2 - Practice Mathematical and Statistical techniques with examples	CA & FE			
LO3 - Solve broadly defined engineering problems using calculus	FE	FE		
LO4- Discuss various numerical methods	FE	FE		
LO5-Demonstrate appropriate numerical methods for various types of problems in engineering	FE	FE	FE	FE
LO6- Use MATLAB commands with numerical methods			FE	FE

Results

Observations of the Semester 1 Calculus Section

Performance at the Mid-semester test: Table 2 shows student performance based on five aspects, assessing LO1 and LO2. It also gives the frequencies with the percentage achievements. Among a total of 451 students, on average 70 per cent had achieved LO1 while 30 per cent had failed. Similarly, LO2 was achieved by 48 per cent and 52 per cent of students weren't successful. Nearly 20 per cent of students scored below 40 per cent and 43 per cent scored above 70 per cent. Students were informed of their performance on the two LOs and common mistakes done by them to improve their performance at the Final Examination

Table 2. *Aspects and LO's Covered by Mid Semester Test in the Calculus Section*

Group 1			Group2		
LO #	Aspect	Frequency, (%)	LO #	Aspect	Frequency, (%)
LO1	Express z in x+iy form	144 (63)	LO1	State De Moivre's Theorem	163 (71)
	Write modulus and argument of z	148 (65)		Convert z into polar form	175 (77)
	Convert z into polar form	158 (69)		Define Hyperbolic functions	174 (76)
LO2	Use relationships with trigonometric functions	123 (54)	LO2	Use De Moivre's Theorem to find the power	111 (49)
	Find the given value	104 (46)		Solve the hyperbolic equation	99 (43)
	Total no. of students	228		Total no. of students	223

Performance at the Semester 1 Final Examination: Figure 1 shows how students had responded to the two questions on Calculus at the FE. Around 9 per cent scored below 40 per cent and around 69 per cent scored over 70 per cent for Question 1 and the respective percentages for Question 2 were 15 per cent and 48 per cent.

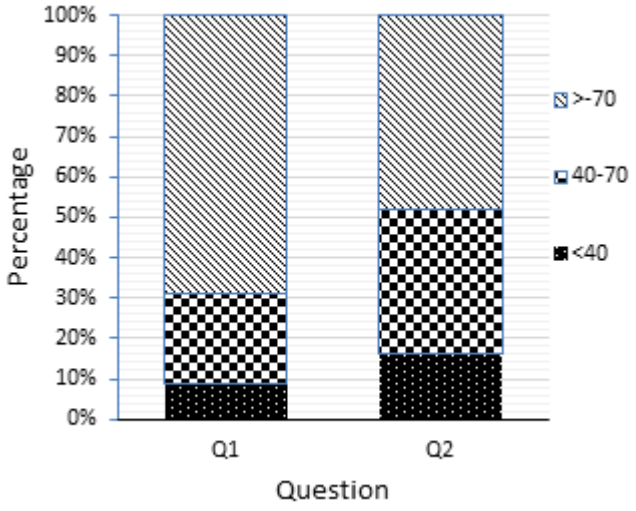


Figure 1. Performance at the Final Examination for the Calculus Section

Observations of the Semester 2 Numerical Methods section

Teaching Methods used: Lecture notes were uploaded to MOODLE; however the students did not bring their printed handout to class. This made the teacher to issue printed handouts. However, it was observed that the students had accessed the PowerPoint presentations uploaded to the LMS.

According to the students' feedback, the average ratings for the method of presentation, teaching skills, handouts, and teacher-student relationship were 3.29, 3.33, 3.19 and 3.22

respectively. The ratings were assessed based on a scale of 4-Excellent, 3-Good, 2-Satisfactory, and 1-Poor.

Performance at Semester 2 Final Examination:

The Final Examination had two questions on Numerical Methods section covering LOs 4 to 6. Around 67 per cent had achieved LO4 and LO5 in Question 1 while 58 per cent had achieved LO4 and LO5 in Question 2. The LO6 was assessed based on the MATLAB activity conducted during the semester. LO6 was also assessed in Question 1 and around 74 per cent had successfully answered Part 1 and 61 per cent in the case of Part 2. This confirms the usefulness of the laboratory sessions in enhancing performance at the Final Examination. Student performance at the FE is given in Figure 2.

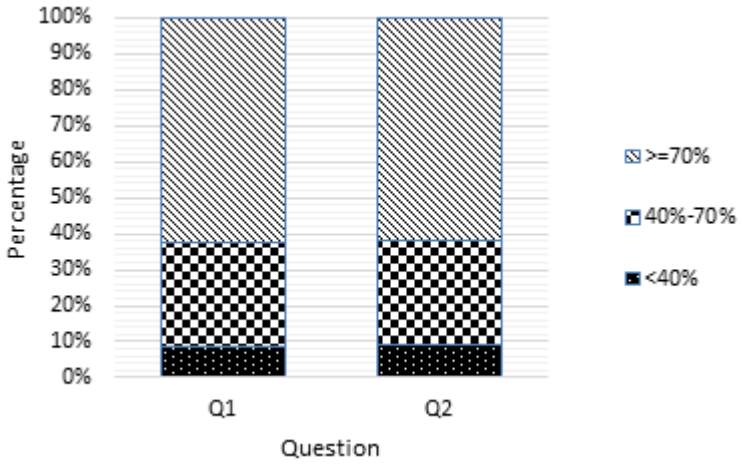


*Figure 2***.** Performance at the Final Examination for Numerical Methods Section

Around 9 per cent of the students scored below 40 per cent and around 62 per cent of the students scored above 70 per cent.

Conclusion

Feedback given on the mid-semester test to achieve the stipulated learning outcomes of the Calculus section has improved student performance at the Final Examination. Teaching methods used in the Numerical Methods section has impacted positively in improving the performance at the Final Examination.

References

Biggs, J. (1999). *Teaching for quality learning at University*. Buckingham, England: The Society for Research into Higher Education & Open University Press.

Brown, S., & Smith, J. (1997). Getting to grips with assessment. SEDA Special No 3, Staff and Educational Development Association, UK.

Gibbs, G., & Habeshaw, T. (1997). Preparing to teach: An introduction to effective teaching in higher education. Bristol, UK: Technical and Educational Services (Original work published in 1989).

Use of analytic rubrics against holistic rubrics to improve the quality of student answers and marking process

A. Kirupananda
Department of Business Management, Informatics Institute of Technology
abarnah.k@iit.ac.lk

Abstract

Rubrics are used to assess students' submissions to evaluate their performances. Most of the time a holistic rubric which defines single criteria is used and there tends to be inconsistency in both assessment and marking. Without knowing what exactly to write, students do not write precise answers. Hence the quality of the answer also goes down. In contrast, an analytic rubric gives the criterion which indicates what intends to be tested and expected levels of achievement. Through experiments, it was found that an analytic rubric helps to improve the quality of student answers and the marking process. When I learnt about the analytic rubric, I explored whether it improves the quality of marking and give better guidance for students to write focused answers. As the criteria are given with different scale indication, this helped to reduce inconsistency level in marking. I introduced an analytic rubric for marking the project proposal report of the Group Project module. The rubric was prepared using the defined criteria. It was given to the students along with assessment specification. Since a detailed rubric was given student got a clear indication of what is expected from this assessment. After marking, when I compared the inconsistency level in marking, it was lowered from 5% to 2%. When the assessments were second marked, there was no inconsistency recorded. Also, I found that the students' work was more focused and comprehensive. There was a 20% increase in marks when the analytic rubric was used. Through this research, I realised that the use of an analytic rubric will improve the quality of student work and the marking process. Student feedback was collected on how they felt about the change and the feedback was positive. This was a qualitative process where the students wrote their feedback in a paper and submitted. As the outcome was good, it is now also being used by many others in their modules.

Background

A rubric is a list of criteria which is used as a guide to assess academic work (Brookhart, 2013). This makes the assessment of students' work easy. Rubrics usually gives a structure and the basis on which the students' work will be graded (Szabo, 2019). In general, rubrics give detailed descriptions of what needs to be assessed. Having the rubric, it will be easy for anyone to mark the assessment. There are mainly two types of rubrics, holistic and analytic rubric (DePaul University, 2019).

A holistic rubric generally uses a single criterion to assess performance. This will be more like in a one column format with points assigned for each criterion. When the holistic rubric is used, a clear framework is required to visualise the relationship between the whole and the part. The SOLO taxonomy (Biggs & Tang, 2007) shown in Figure 1 can be used as a conceptual framework to support this.

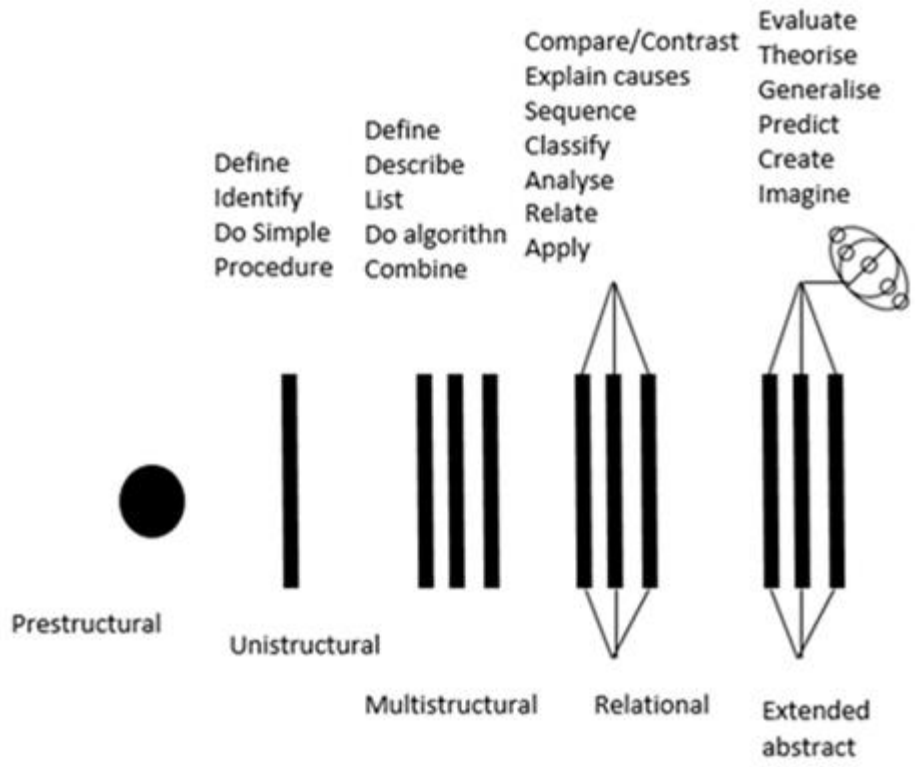


Figure 1. Solo Taxonomy (Biggs & Tang, 2007)

An analytic rubric gives the criteria with a percentage of contribution and each criterion will then have different scales. The rubric is developed in a tabular format. The criteria indicate what needs to be tested and the scale indicates the level of achievement.

When it comes to marking, it can be subjective and there should be consistency especially when there is a panel of examiners for a single assessment. Analytic rubrics can help to bring that consistency in marking (Biggs & Tang, 2007). Consistency is very less with holistic rubrics as it does not give the points for a different level of achievement. While it is always good to give the rubric to the students along with assessment, the use of an analytic rubric will make them be more focused.

Until I learnt about analytic rubrics I used holistic rubrics for marking. As my module is shared with another lecturer we shared the marking too. I observed that there was a small percentage of inconsistency in marking, which is around 5%. This was identified by the second marker during marking. After marking we spent a significant time to resolve the inconsistency level. When I learnt about the analytic rubric, I realised that it is a lot more indicative and it gives a better guide for marking. As the criteria are given with different scale of indication, I thought this will help to improve the marking process.

Methodology

I introduced analytic rubric for marking the proposals in the Software Engineering Group Project module. I prepared the rubric using the initially defined criteria and discussed with my co-lecturer. Minor changes were made to the rubric after discussion and the revised rubric is given in Table 1.

Table 1. *Criteria used in the analytic rubric*

Criteria	Allocated marks	Below Expectation	Need Improvement	Satisfactory	Very Good	Exceptional
		0-29	30-49	50-69	70-79	80-100
Abstract	10	No Abstract	Abstract is incomplete with vague information	Abstract is satisfactory	Clear and can apprehend the system	Clear and comprehensive. Gives a good insight to the project
Project Background	10	Not identified the project domain	Demonstrates poor apprehension about the domain	Demonstrates good apprehension of the domain but some explanations are not convincing	Demonstrates clear apprehension of the domain	Demonstrates clear apprehension of the domain with good referencing.
Problem Domain	20	Identified problem does not exists or wrong	Problem is not sufficiently well described	Few problems are described	All the problems are well described	Problem is described with Evidence.

The rubric was given to the students along with the assessment specifications. Students were briefed on how this analytic rubric is used in marking and how they can use it to structure their answers. Since a detailed rubric was given, students got a clear indication of what is expected from this assessment. Once the student submitted the reports, both the lecturers marked their submissions. After marking, marks were corrected for any inconsistency.

The marks were released to students along with the rubrics so that they understood the sections they had received low scores. Students were asked to give written feedback to the module team regarding this method, as to whether they welcome this change. It was more of a qualitative feedback.

Results

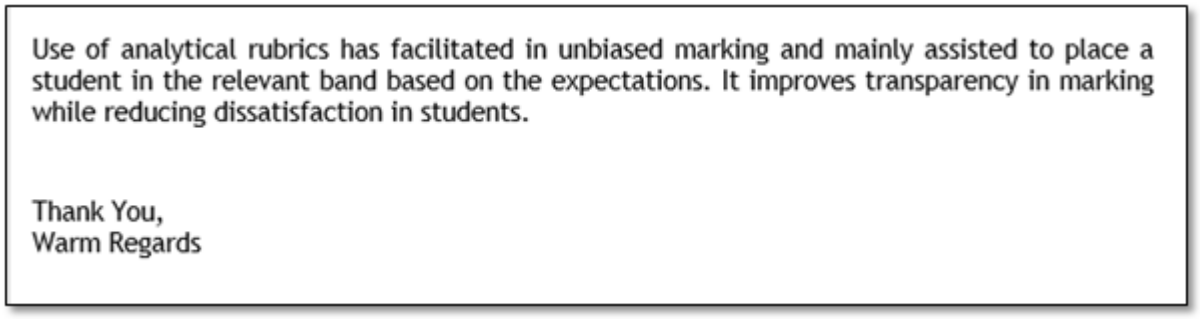
After marking, the co-lecturer and I analysed the marks. We found that there was less than 2% inconsistency in marking, which is acceptable. As a practice, a second marking of scripts is done by another lecturer. The second marker also found that both lecturers have marked in a consistent manner. We also observed that they have submitted a much more comprehensive report, focusing more on the important chapters.

The feedback from the students show that, they welcome the introduction of this rubric, since it had conveyed the teacher's expectations and to secure a good grade. With holistic rubrics,

students tend to assume that their responses met the teacher's expectations. In case of the analytic rubric the scale indicated the level of achievement, and their expectations matched with the marks received. However, around 5% of students found it difficult to comprehend the given rubric.

Discussion and Conclusions

This paper shows that the use of an analytic rubric helps to improve the quality of assessment marking. It shows that defining the criteria and scale increases the consistency in marking, especially when many teachers are involved in the marking. This practice was accepted by other colleagues at the Institute and many of them are using it now. Figure 2 shows the feedback received from a colleague, who applied this for her module.


Use of analytical rubrics has facilitated in unbiased marking and mainly assisted to place a student in the relevant band based on the expectations. It improves transparency in marking while reducing dissatisfaction in students.

Thank You,
Warm Regards

*Figure 2***.** Feedback from a colleague who had introduced this method in her module

Students' feedback was positive and have motivated many others to adopt this process in the modules they teach.

References

Biggs, J., & Tang, C. (2007). *Teaching for Quality Learning at University*. Maidenhead, England: Open University Press & McGraw-Hill Education.

Brookhart, S. M. (2013). *How to create and use rubrics for formative assessment and grading*, Alexandria, VA: ASCD publications.

Szabo, Z. (2019). *Use of rubrics for assessment and student learning*. Retrieved July 11, 2019 from https://provost.rpi.edu/sites/default/files/RUBRICS.pdf.

DePaul University (2019). Types of Rubrics. Teaching Commons - DePaul University. Retrieved February 4, 2019 from https://resources.depaul.edu/teaching-commons/teaching-guides/feedback-grading/rubrics/Pages/types-of-rubrics.aspx.

Use of curriculum mapping and gap identification as a framework for quality enhancement of degree programs

S. Karunaratne
Department of Civil Engineering, Faculty of Engineering, Sri Lanka Institute of Technology
shiromi.k@sliit.lk

Abstract

With increased questions being posed on Higher Education standards, curriculum mapping is an important quality assurance tool in determining whether curricular meet specified standards by the accrediting bodies and the degree awarding Institutions. This paper presents a case study, in which a curriculum mapping was performed to identify the adequacy of module learning outcomes (LOs) to achieve the program outcomes (POs) and the depth/breadth (learning complexity) addressed in each module in a four-year B.Sc. Eng. (Hons) in Civil Engineering degree program conducted at Sri Lanka Institute of Information Technology, for accreditation purposes. A structured approach was used for mapping at module level according to Bloom's taxonomy, as specified by the accrediting body, by examining into the assessment level, using a structured mapping table. The subject matter experts referred to their developed assessment rubrics or marking schemes of each assessment and referenced the marks to the POs as a percentage. This approach showed how each module in the program contributed to the POs as a whole. Module assessment components were further evaluated to identify the gaps in learning/thinking skill levels based on the weights (in %) assigned to assessment components. The analysis showed that out of 37 credits offered during the 1st year, 71% of credits were assessed in lower-order thinking skill (LOTs) levels (1-3). As the academic levels progressed, assessment in LOTs dropped to 20% in year 4, while assessment of higher-order thinking skills (HOTs) increased from 29 to 80% from year 1 to year 4. According to the analysis, it can be stated that the progression of learning complexity throughout the four years could meet the required standards by the accreditation body and the Institution, showing a gradual transition of LOTs to HOTs. It was clear that this approach can be used to improve curricular through gap identification.

Background

With increased questions being posed on Higher Education standards, quality assurance tools need be in place to determine whether curricular meet with specified standards by the accrediting bodies and the degree awarding Institutions (Ewell, 2013). Curriculum mapping brings in multi-facets of benefits such as improving program consistency, increasing the likelihood of the students achieving the expected program-level outcomes, creating a feedback loop among faculty, encouraging reflective practice and most importantly, aligning assessments with desired learning outcomes. Curriculum mapping also plays a key role in determining whether the curriculum meets specified standards (Harden, 2001). Several learning taxonomies are put forward to specify hierarchical development of intellectual skills (e.g. Bloom's (1956) taxonomy and Biggs and Collis' (1982) SOLO taxonomy). Development of the knowledge, skills and attitudes of an undergraduate student over the study period is ensured through the complexity of these learning taxonomies. Institution of Engineers Sri Lanka (IESL) recommends Bloom's taxonomy in developing module-level learning outcomes for engineering programs in Sri Lanka. The same can be used to align assessment tasks with

program outcomes making sure the students archive the highest level in the learning framework by the time of graduation. This paper presents a case study, in which a curriculum mapping was performed to identify the adequacy of module learning outcomes (LOs) to achieve the program outcomes (POs) and the depth/breadth (learning complexity) addressed in each module in a four-year B.Sc. Eng. (Hons) in Civil Engineering degree program conducted at Sri Lanka Institute of Information Technology for accreditation purposes.

Methodology

Description of the course structure: The B.Sc. Eng. (Hons) in Civil Engineering degree program selected for this study has eight teaching semesters with 150 credits. The program has defined nine (09) program outcomes (POs) to identify the profile of the civil engineering graduate at the point of graduation. SLIIT has defined eight Institutional graduate attributes (GAs) for all the graduates of the institute. Also, the Institution of Engineers Sri Lanka (IESL) has defined 12 graduate attributes for engineering graduates in Sri Lanka. The overall program outcomes (POs) are expected to be achieved through the achievement of module learning outcomes. The senate approved programme curricula with the corresponding module outlines record all the necessary information such as the credit allocation, module learning outcomes (LOs), assignment details, module content and references.

Testing the adequacy of LOs to achieve the POs: Curriculum map is the relation of "a two-dimensional matrix that represents individual courses on one dimension and competencies/outcomes on the other" (Ewell, 2013). Usually, this process includes an assessment of whether or not the desired outcome is achieved through the course, the level of proficiency required, whether the outcome is directly assessed and other issues. In the present study, moving a step forward, the level of achievement of the desired outcome was assessed through a rational quantification method using assessment marks. It was expected that this approach could help the program accreditation agencies to make an informed judgment about the courses being assessed. A systematic approach was used for mapping at module level using Bloom's taxonomy, as specified by the accrediting body, by examining into the assessment level, using a structured module mapping template (not shown).

Extracting the information relating to module LOs and POs was the most challenging part of the assessment as there is no direct yardstick to derive the information. Initially, the module mapping template collected the factual information for the mapping exercise by referring to Senate approved module outlines and also directly interviewing the subject matter experts (SMEs). Module outlines provided the LOs, assessment weights and the respective POs. Necessary information was extracted by going into the assessment level while interviews with SMEs provided the details such as the complexity of each assessment component according to Bloom's taxonomy, their weights to POs and LOs. The SMEs referred to their developed assessment rubrics or marking schemes and referenced the marks to the POs as a percentage. Each assessment component was analysed in a similar manner and the summation of the percentages deriving from each assessment component was totalled to find the overall contribution of the module to each PO. The same procedure was followed to assess the contribution from each module to the POs in percentages and total contribution from all the modules to the POs were estimated by summing up all the percentage contribution from individual modules from 1st to 8th semesters. This gave the overall emphasis of POs through the program delivery. This exercise provided the ground information for the assessment of

the adequacy of LOs to achieve the POs and curriculum gap identification analysis.

Assessment of the depth/learning complexity of module outcomes: In a degree program, it is of paramount importance to evaluate the achievement of learning. The cognitive domain can be considered as the core of the learning domain while the other two domains (affective and psychomotor) require at least some of the cognitive components. Within each domain, multiple levels of learning that progress from more basic, surface-level learning to more complex, deeper-level learning exist. This study used Bloom's taxonomy to classify learning complexity according to six cognitive levels: knowledge, comprehension, application, analysis, synthesis, and evaluation (Kasilingam, Ramalingam, & Chinnavan, 2014) and they were ranked in the order of 1 (knowledge) to 6 (evaluation), respectively.

Establishing the learning complexity assessed from a given module was a two-way process i.e., top-down and bottom-up approaches. In the top-down approach, the existing curriculum was tested by assessing the LOs against Bloom's taxonomy based on the action verbs used and were given a value ranging from 1-6 for the categories from knowledge to evaluation, respectively. The bottom-up approach was used to verify this information at the assessment level. Each assessment was analysed in detail by going into assessment marking schemes/rubrics level to benchmark the depth/complexity of learning achieved through each assessment component and categorised them according to Bloom's taxonomy. The weights (in %) given to each assessment component was taken as the basis for the quantification. This process was mediated through the interpretation of the SMEs in the respective subject area. Then these assessment weights were converted into credit weights for analysis.

Results

Table 1 shows a part of the module map generated for B.Sc. Eng. (Hons) in Civil Engineering degree program. Letters 'L', 'M' and 'H' denotes the degree of emphasis of a particular module in achieving the desired POs at the module level. Depending on the marks allocated, L, M and H would indicate the ranges of 0-33%, 34-66%, 67-100%, respectively. This notation was used as per the accreditation requirements, converting the percentage values obtained from the module level mapping. For example, the analysis showed that the contribution of module CE 1912 for PO2 as 40%, hence' level of contribution as indicated on the map. It was evident as expected, the module contribution for desired POs varied from low (L) to moderate (M) in early years (1 to 2) while the same varied from moderate (M) to high (H) in the later years in the degree program. The gaps were identified accordingly.

Table 1. *Part of the module map for the Programme in achieving the desired POs*[1]

Mapping of the programme									
Year	Module code	Program outcomes (POs) of the Department of Civil Engineering							
		1	2	3	4	5	6	7	8	9
1	CE1912	M	M	L	M	L	L	M	M	M
	EC1021	H	H	L	L	L	H	M	M	L
	MA1302	L	M	L	L					
	CE1011	H	H	M	L			M	L	L
	ME1011	M	M	M	M	M	H	M	M	M

[1] Low–L (0-33%), Medium–M (34-66%) and High–H (67-100%) based on assessment marks.

Table 2 shows a part of the analysis table on how modules through their assessments were related to Bloom's hierarchy of learning over the four years of the degree program. Based on the contribution for each learning level, an average value was allocated for a module as shown in the last column. Figure 1 was derived from the data arising from this analysis.

Table 2**.** *Part of the detailed module assessment map in relation to Blooms hierarchy*[2]

Assessment marks in relation to Blooms hierarchy										
Year	Semester	Module code	Credits	1	2	3	4	5	6	Average assessment level
1	I	CE1912	2	13	35	52				2
		EC1021	3	18	27	30	25			2
		MA1302	3		40	40	20			2
		CE1011	4	5	5	60	30			2
		ME1011	4		30	45	25			2
		EL1202	2			55			45	4
1	II	ME1030	3	10	10	30	30	10	10	3
		MT1010	4	10	30	30	20	10		2
		MA1312	3		32	32	36			3
		EC1441	3	6	6	52	32			3
		ME1040	4			63	25	12		3
		EL1212	2		10	90				2
2	I	CE2211	4	12.5	12.5	40	10	15	10	3

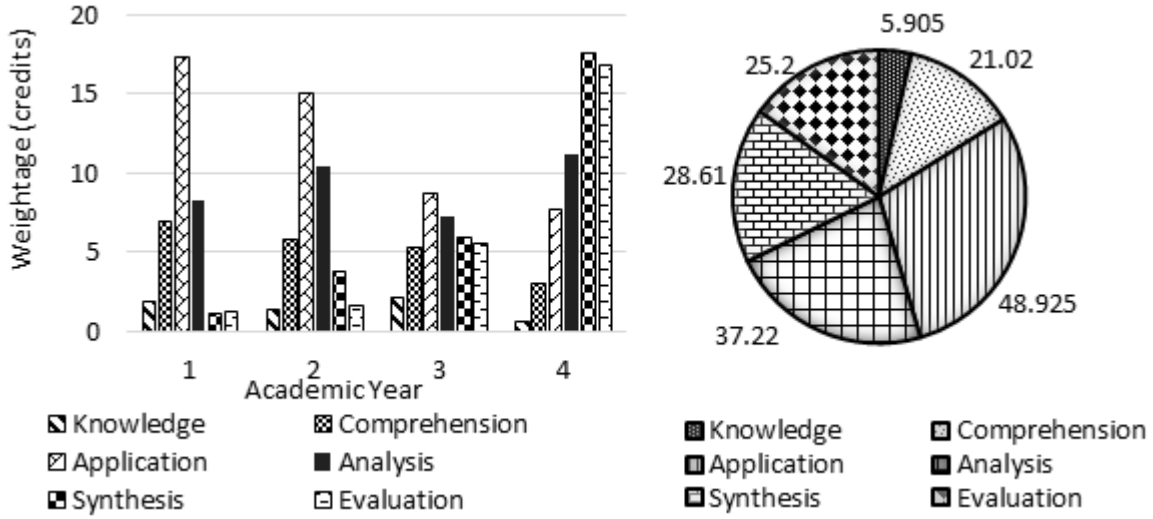
[2] values shown under Bloom's hierarchy are percentage arising from assessment weightages

According to Figure 1a, out of the total of 37 credits offered during the 1st year, 27 credits were assessed (71%) in lower-order thinking levels (LOTs). With the academic levels progressed, LOTs assessment dropped to 20% in year 4, while assessment of higher-order thinking skills (HOTs) increased from 29 to 80% from year 1 to year 4, respectively. According to the analysis, it can be stated that the progression of learning complexity throughout the four years seem to be appropriate showing a gradual transition of LOTs to HOTs. Figure 1b shows the composition of the learning complexity offered at the program level. It can be seen that 46% of the credits at the program level are assessed in LOTs while 54 % assessed in HOTs, which can be considered as desirable in a good engineering degree program.

Discussion and conclusions

The structured methodology adopted to prepare curriculum maps and to assess the learning complexity of the degree program during the current study proved to be successful. The process has emerged as the basis for many comprehensive assessment systems drawing on evidence from assignments (Halualani, 2010). The assessment of the module learning outcomes (LOs) showed that overall contribution from all the modules offered during the four years contributed to achieving the desired POs in a moderate to high level of the four-year B.Sc. Eng. (Hons) in Civil Engineering degree program conducted at Sri Lanka Institute of Information Technology. The assessment level investigation with respect to learning complexity according to Blooms's taxonomy showed how lower-order thinking skills (LOTs)

shifted to higher-order thinking skills (HOTs) over the four years. It can be further stated that the progression of learning complexity throughout the four years seem to be appropriate showing a gradual transition of LOTs to HOTs. Overall, the present study elaborated the use of a practical methodology which enables to assess the contribution of modules to achieve the POs and the learning complexity, and to identify the gaps with respect to program outcomes/graduate attributes or learning complexity. This information can be used to take corrective measures to improve curriculum assessment, design, and delivery.



(a) (b)

*Figure 1***.** (a) Learning complexity of the modules according to Bloom's taxonomy over the 4 years; (b) Composition of the learning complexity of the degree program

References

Biggs, J. B., & Collis, K. F. (1982). *Evaluating the quality of learning, The SOLO taxonomy (Structure of the Observed Learning Outcome)*. New York & London: Academic Press.

Bloom, B. S. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals by a Committee of College and University Examiners (Handbook 1)*, London, England: Longmans.

Ewell, P.T. (2013). The Lumina Degree Qualifications Profile: Implications for assessment. (Occasional Paper No. 16). Urbana, IL: University of Illinois, Indiana University, National Institute for Learning Outcomes Assessment. Retrieved from http://www.learningoutcomesassessment.org/documents/EwellDQPop2.pdf.

Halualani, R. T., Haiker, H, & Lancaster, C. (2010). Mapping diversity efforts as inquiry. *Journal of Higher Education Policy and Management*, 32(2), 127-136.

Harden, R. M. (2001). AMEE Guide No. 21: Curriculum mapping: a tool for transparent and authentic teaching and learning. *Medical Teacher*, 23(2), 123-137.

Kasilingam, G., Ramalingam, M., & Chinnavan, E. (2014). Assessment of learning domains to improve student's learning in higher education. *Journal of Young Pharmacists*, 6(1), 27-33.

Use of reading groups to overcome reading reluctance and enhance learning skills among Social Sciences undergraduates

E.L.S.J. Perera
Department of Demography, University of Colombo.
sunethrae@gmail.com

Abstract

One of the key problems observed in undergraduate student learning is getting students to complete the required readings given for the respective course units. Many students focus on lecture notes and Powerpoint presentation slides given by lecturers and are reluctant to engage in assigned readings. As a result, they lack skills in deep learning and hence, are weak in constructing arguments, asking questions and writing successful answers at examinations. It is evident that collaborative learning through reading groups is one strategy that can enhance active learning and deep reading among student groups. Therefore, this paper addresses why students' reluctance to engage in required readings and whether reading groups can be used to create interest among Social Sciences undergraduates to improve their reading skills while engaging in active learning. The study sample consisted of a group of 17 fourth-year students who followed the course unit 'Demography for Urban Planning and Policy'. Four reading groups were formed and then each group was guided to identify reasons for not completing required readings and to prepare their own plan to complete the given readings within five weeks. Groups were asked to present and discuss the summary of readings in discussion classes. The analysis was based on student performance at the mid-semester examination and student feedback on the outcome of the activity. Almost all students agreed that reading groups helped them to improve their reading skills. More than 70 per cent of students felt that it helped them to develop their other skills such as communication skills, analytical skills, teamwork skills and also questioning skills. Student's performance was positively associated with their self-rated perceptions on the usefulness of the activity. Reading groups can, therefore, be used to improve reading reluctance, reading skills and active learning among undergraduates while enhancing their other skills.

Purpose

It has frequently been observed that getting students to complete the required readings is difficult and 'critical reading' skill is also lacking among Social Science undergraduates. Many students depend on lecture notes and Powerpoint presentation slides given by lecturers. Students are reluctant to engage in assigned readings and hence they are being blamed for not reading critically. As a result, they are weak in constructing arguments, questioning and in providing written responses. Previous research on student learning shows that collaborative learning through reading groups is a strategy that can enhance active learning and deep reading among students (Parrott & Cherry, 2011; Pedersen, 2010; Snow, 2002). Higher education teaching and learning is associated with reading, and 'engaged critical reading skills' are vital in successful student learning (Aldridge, 2019). Group learning also provides a vital opportunity for students to work as teams and learn together while enhancing their learning skills and self-image (Biggs & Tang, 2011; Gibbs, 1988; Malsha, Senadhi, & Perera, 2018). Therefore, the objective of this paper was to examine the reluctance of learners to engage in required readings of the respective course units and whether reading

groups can effectively be used to create interest among Social Sciences undergraduates to improve their reading skills while engaging in active learning.

Methodology

The reading group activity was implemented for Fourth Year Students in the Honours Degree Programme for the course unit Demography for Urban Planning and Policy (DMG 4179). This is a course unit, offered for the first time and the study population consisted of a group of 17 students. The students were told the expected learning outcomes, teaching and learning activities and the method of assessment of the course unit during the first lecture. Then a questionnaire was given to assess their reading practices, especially to determine whether they had engaged in readings given in the respective courses offered during previous years, and if not, they had been asked to state their reasons for their reluctance to read. The reasons given by students varied and were due to individual reading habits and lack of English language skills (as many reading materials are available only in English). Having identified the reasons for their reluctance to read, teaching, learning and assessment activities were focused on addressing this issue; collaborative learning through reading groups was also introduced. Four reading groups were formed; each group was asked to identify reasons for not completing the required readings and they were made to prepare their own plan to overcome obstacles and to complete the given readings within five weeks. Student groups came up with plans to complete assigned readings. Students' plans had included having group meetings to discuss assigned reading materials at least twice a week. Each group was asked to present and share the summary of readings done during the previous week, with other groups, during the discussion classes. After six weeks, students' progress, the outcomes of the reading groups, and students' perception of the activity were assessed through a feedback questionnaire and based on their mid-semester test scores.

Results

The student feedback which was taken after completing the given reading group activity showed a positive influence on reading skills development, compared to them working as individuals. All students agreed that reading groups helped them to improve their reading skills and acquire knowledge on the subject. More than 70 per cent of students felt that the reading groups helped them to develop subject knowledge as well as other skills such as communication skills, analytical skills, team-work skills through participation in discussions, finding and analysing facts, questioning and responding. Table 1 summarises feedback on students' perception of reading in groups.

In addition, the examination of mid-semester answer scripts also confirmed that when students do the required readings, they can better their performance in achieving course learning outcomes. More than 60 per cent of students had obtained a grade of B+ (65 %) or above for the mid-semester test. The mid-semester marks obtained for the course DMG 4179 had positively associated ($p<0.05$) with the mean value of students' self-rated perceptions on the reading group activity.

Table1**.** *Student perception on reading groups to overcome reading reluctance and enhancement of leaning skills*

Student perception /key areas	Descriptive Statistics			Self- rated Student feedback (%)				
As a result of this activity:	Number	Mean	SD	Strongly disagree	Disagree	Somewhat agree	Agree	Strongly agree
I am able to acquire reading skills	17	4.12	.33	0.0	0.0	0.0	88.2	11.8
My communication skills have improved	17	4.24	.56	0.0	0.0	5.9	64.7	29.4
I am able to discuss more facts/examples with my reading group members & improved knowledge on the subject	17	4.53	.51	0.0	0.0	0.0	47.1	52.9
I feel confident in asking questions	17	3.82	.81	0.0	5.9	23.5	52.9	17.6
I feel confident in analysing facts	17	4.00	.71	0.0	0.0	23.5	52.9	23.5
I feel confident in answering questions	17	3.88	.78	0.0	5.9	17.6	58.8	17.6
I am satisfied with the participation by group members	17	4.29	.47	0.0	0.0	0.0	70.6	29.4

Source: Based on student feedback forms

Discussion and Conclusions

Findings indicated that reading groups can be used to overcome reading reluctance and enhance learning skills among Social Sciences undergraduates. The findings further revealed that the process involved in reading groups had facilitated students to experience that they can acquire more knowledge and skills during their engagement in reading groups. It is important to note that the findings of this study cannot be generalised due to the small population size (n=17) and hence need to conduct this study using a larger sample size. However, throughout the reading activity process, it is observed that reading groups can be used as an effective method to overcome reading reluctance and enhance learning skills among Social Sciences undergraduates.

References.

Aldridge, D. (2019). Reading, engagement and higher education, Higher Education Research & Development, 38(1), 38-50, DOI: 10.1080/07294360.2018.1534804.

Biggs, J., & Tang, C. (2011). Teaching for Quality Learning at University: What the Student Does (4th Ed.). Retrieved on July 21, 2019, from https://pdfs.semanticscholar.org /1f96/f4a66767293cf2902652ac9eadfa8ef51f13.pdf.

Gibbs, G. (1988). *Learning by Doing, A Guide to Teaching and Learning Methods.* Oxford Centre for Staff and Learning Development, Oxford Brookes University, UK.

Malsha, R., Senadhi, N., & Perera, E. L. S. J. (2018). Changing student perceptions on their initial skill and self-image enhancement through course-based research engagement. 14th Annual SLAIHEE Conference on Higher Education, Colombo, Sri Lanka, 78-81.

Parrott, H. M., & Cherry, E. (2011). Using Structured Reading Groups to Facilitate Deep Learning. *Teaching Sociology*, 39(4), 354-370, Retrieved on April 4, 2018, from https://www.jstor.org/stable/41308966.

Pedersen, D. E. (2010). Active and Collaborative Learning in an Undergraduate Sociological Theory Course. *Teaching Sociology*, 38(3), 197-206.

Snow, C. E. (2002). A research agenda for improving reading comprehension (Chapter 4), *Reading for Understanding: toward a R&D program in reading comprehension*, RAND Reading Study Group, 29-59: RAND Corporation. Retrieved on April 8, 2019, from https://www.jstor.org/stable/10.7249/mr1465oeri.12.

Transforming student-centred learning towards bilingual English fluency

N. Perera
Department of English Language Teaching (DELT), University of Colombo
nicolaperera@delt.cmb.ac.lk

Abstract

English knowledge/skills are generally lacking among Fourth-Year undergraduates, despite maximum exposure to English teaching and passing successive English examination levels each year. Seeing students struggle to develop bilingual English fluency in First-Year classes, I used methods taught in the CTHE teaching development course and posed a research question on whether learning would improve on changing my authoritative teaching style and adopting a student-centric classroom pedagogy. I upended my authoritative teaching style by facilitating a class of 29 students to collaboratively peer-teach and help each other make connections to previous knowledge, with only my *minimal* instruction. This resulted in the student-instructors and the rest of the class creating a positive peer support and pressure towards the task of learning. Feedback was collected through written self-reflections on the learning experience, supplementing my own observations. Feedback showed increased alertness and interest (70%+ increase from baseline); more alacrity to participate, including by quieter students (90%+ increase); and regularity in completing homework (70%+ increase). I observed that the student-teachers acted as informed participants, fully cognisant of the context, rationale, and their potential learning improvements. The scaffolded student-centric lessons pushed the class towards more engaged active learning, resulting in motivational and confidence shifts required for developing reading beyond the classroom as a consistent, self-driven practice. The teaching practices and observations discussed more fully in my paper show how to bring about heightened undergraduate interest, determination, and motivation to learn English, including the crucial change, to read regularly on their own. The fostering of quality teaching requires supporting the consistent deployment of such pedagogic strategies if undergraduates are to be assisted to acquire English competence and fluency.

Background

This intervention arose out of my desire to address the apparent paradox of my entire Fourth-Year, Level Four (corresponding to UTEL[2] benchmark 7) class each year continuously failing to achieve a passing grade, despite having risen up through Levels 1-3 (UTEL benchmarks 4-6) and annual examinations. The first three Levels fall under the Proficiency Course in English while the highest is the Certificate level. The Faculty of Arts stipulates completion of only Level 2 as a mandatory requirement for a student to earn her degree; a smaller number of students choose to take up Levels 3 and 4 ELT classes, presumably through a desire to learn more English, as well as for the added boost to the marketability of their degree that the ELT Level 4 Certificate represents to them. My colleagues and I see that the students' struggles at this

[2] University Tests of English Language – Academic Purposes (UTEL – A). Resulting from a 2002-2004 project funded by the British Council in cooperation with the ELT Units across the system, the UTEL benchmarks define the English skills and competence that should be learned by (and taught to) undergraduates.

stage lay bare a failure to accumulate language skills and competence in the previous years that impedes the fluent wielding of the language that L4 demands.

While the teaching-learning failure here is a knotty issue, ELT teachers are familiar with being called upon to compensate at the higher education stage for shortcomings in a much longer secondary education; the attitudinal and motivational baggage students carry into our classrooms due to that personal history of not learning; limited contact hours; the socio-economic privileges attending fluent bilingualism; and, perhaps most significantly, a dearth of language stimuli and exposure beyond the ELT classroom.

So, my Fourth-Year L4 classroom compelled uncomfortable questions deconstructing what I was doing in my First-Year L1 classroom. How would I teach so that students would be motivated to learn more than what was required to pass the ELT examinations? So that they would engage in constant self-directed learning beyond the classroom, particularly by reading in English for no more reason than they wanted to. The pedagogical response in my First-Year classroom[3] was to break down and reconceptualise what active learning meant from the student's perspective, as groundwork for every student to discover the intrinsic motivation to slowly build up a habit of reading in English, i.e. the continuous flood of language stimuli indispensable for deep learning of language structures.

First, let's tackle the issue of motivation. Extrinsic motivation is the bugbear of the ELT classroom where the next examination completely dominates the students' tunnel vision: per Biggs and Tang (2007) it is "a standing invitation to students to adopt a surface approach" to their learning, i.e. knowledge sufficient for a fill-in-the-blanks question, but not the fluency for an essay. Our students' construction of their learning experience in terms of examinations and grades is highly damaging because "negative reinforcement is worse than positive … if the learning is not successful, punishment is implicated, which introduces a range of side issues, such as anxiety, anger, shame" (p. 35). Significantly, implied here is the idea of motivation as a *feedback loop*, where students' feelings of disappointment, frustration, anger, and helplessness, resulting from bad teaching, poor learning, poor results, in turn, fail to generate the motivation and effort indispensable for active learning. Conversely, 'a history of successful engagement with content that is personally meaningful, the student both builds up the knowledge base needed for deep learning and, motivationally, develops the expectations that give confidence in future success: what are known as feelings of what psychologists call self-efficacy or more simply "ownership": "I can do this; this is my thing" (Biggs and Tang, 2007, p. 33). But the University of Colombo (UoC) Arts undergraduate confronts a pernicious dilemma: Why strive to read in English by myself when knowing what is in the modules is enough to pass Level 2? Race (2007) muses that "despite being very close to 'emotion'," motivation is "a rather cold word: *wanting* is a much more human word. Everyone knows what 'want' means. Also, *wanting* implies more than just motivation. *Wanting* goes right to the heart of human urges, emotions, and feelings. When there's such a powerful factor at work helping learning to happen, little wonder that the results can be spectacular" (p. 10).

[3] Drawing heavily upon what I learned in the course for the Certificate of Teaching in Higher Education, conducted by the UoC Staff Development Centre as mandated training for faculty.

The ELT classroom is, therefore, a critical site of engagement. Gibbs and Habbeshaw (1992) warn that "Students' experience of lectures is often characterised by solitude, passivity and, after twenty minutes or so, somnolence" (p. 53). In addition, "learners construct knowledge with their activities, building on what they already know. Teaching is not a matter of transmitting but of engaging students in active learning, building their knowledge in terms of what they already understand" (Gibbs & Habbeshaw, 1992, p. 21). Many ELT teachers would concur that group activity bestirs the student to participate more than a solitary exercise, that applying the lesson content is better than mere reproduction. Also, I find myself increasingly leaning towards Fink's (2013) notion of learning as a dialogue the student engages with herself, her peers, and the teacher, capturing both the student's internal monologue (thinking, processing, reflecting) and social construction of knowledge with the teacher and peers. I increasingly favour the theory that strengthening the collaborative element in the English classroom, particularly throwing students into interdependence with each other, is the key to deeper, more robust learning. Briefly, active learning is indivisible from active teaching.

Methodology

My turning-point was in seeing that neither the clarity of my explanation, nor my rapport with the students and their comfort in the classroom, nor their engaging in the usual group activities was creating that desire to learn and effort which underlies the acquisition of fluent bilingualism. Hence, I chose not to adopt the authoritarian pose of the teacher dispensing knowledge. Instead, for the duration of the lecture, groups of 2-3 students come up to the front of the room and teach: they read out the lesson, explain (resorting to the vernacular where necessary), ask questions, write on the board themselves or call on other students, and check for comprehension in the class. The student-instructors and the rest of the class are very clear that I speak only in very specific instances—for instance, to clarify the meaning of a word they haven't encountered before or cannot surmise from the context or a new point of grammar. I closely follow along, intervening or tweaking at points to guide the dialectic between student-instructors and class, to ensure the lesson is created in the way most meaningful to them. The fundamental condition that the class and I have agreed upon is that I will not break the silence, while they struggle towards answers, in the interests of moving on with the lesson. Crucially, we've discussed the rationale behind the method, so that the whole class comprehends that we are trying through collaborative active learning, to stimulate the desire to learn beyond the lesson material and exam requirements by reading. To that end, I cull brief, easy texts from weekly newspapers and other sources to distribute in class.

Results

The baseline prior to the intervention was set via a Likert scale where students ranked their (a) alertness and interest, and (b) willingness to participate/speak, in class, and self-reflections about their interest and challenges in learning English, particularly if and how often they read by themselves. Feedback was collected through written self-reflections on the class's learning experience within the new pedagogical paradigm, supplementing my own observations. The results showed increased alertness and interest (70%+ increase from baseline); more alacrity to participate, including by quieter students (90%+ increase); and regularity in completing homework (70%+ increase).

Discussion and Conclusions

Since permanently shifting to this teaching practice a few months ago, there has not been a single occasion of a student *refusing* to teach. Contrast this with the routine difficulty, not unique to ELT classes, of persuading students to speak up with an answer to a question, even when they are confident of its correctness. The small groups in which the student-instructors work certainly represents a safety net, for they lean into the peer support to articulate the lesson; however, I believe that seeing their peers stand up in front of the whole class piques a lot more interest in what is transpiring during the lecture than the thoroughly unremarkable spectacle of the teacher, as always, teaching: it generates and channels a form of positive peer pressure that inscribes the lesson in a memorable way. Significantly, in the course of a lesson, the teaching frequently extends beyond the designated instructors, with contributions flowing from the rest of the class.

My most challenging task is learning how not to intervene too quickly, to allow the process of students' configuring new knowledge or making connections to previous knowledge play out in its own time. Commitment to this process means accepting that a lecture may not create the same dynamic as the previous one, can very well fall flat with students floundering, laboriously trudging through the material. What compels me to keep faith with this method is seeing the quieter students developing the confidence to perform the role of student-instructor. Essentially, this class understands that they and I are trying to learn in unaccustomed ways, discarding the practices that have consistently failed us, to strike out for new ground where learning English becomes a less futile endeavour for the student.

The students' self-reflections reveal no instantaneous transformations into ardent readers; instead, there is a new consciousness of how to practically disassemble the burden of learning English into manageable pieces, habits, and attitudes—small steps towards the pleasure of reading—which my students are convinced are steps in the right direction.

References

Biggs, J., & Tang, C. (2007). *Teaching for Quality Learning at University; What the Student Does* (3rd ed.): McGraw-Hill/Society for Research into Higher Education & Open University Press.

Fink, L. D. (2013). *Creating Significant Learning Experiences: An Integrated Approach to Designing College Course* (2nd ed.). San Francisco, CA: Jossey-Bass.

Gibbs, G., & Habeshaw, T. (1992). *Preparing to Teach An introduction to effective teaching in higher education.* Retrieved from https://creativecommons.org/licenses/by-nc-sa/2.0/uk/.

Race, P. (2007). *The lecturer's toolkit: A practical guide to assessment, learning and teaching* (3rd ed). London and New York: Routledge.

An interventional experiment in altering student perception of key study motivation factors

J.A.K. Mascranghe
Informatics Institute of Technology, Colombo, Sri Lanka
austen@iit.ac.lk

Abstract

The aim of this study was to explore student perception of key factors related to study motivation, which were ascertained before the teaching session, and after an intervention designed to alter them during the teaching session. Student's level of motivation influences engagement, focus, and effort expended in learning. A non-overlapping set of motivation factors were selected from the literature. The research questions were whether students could be profiled according to the extent of each motivation factor present; and could motivation factors be changed by lecturer intervention. The motivation factors examined were: Do the students perceive the subject as interesting (MF1)? Does the course help achieve targeted academic goals (i.e. to receive an honours degree) (MF2)? Does it help build skills for life (MF3), and will it be helpful for future career development (MF4)? The above subset was chosen from literature because these are attributed by parents and lecturers of millennial generation students as relevant factors (anecdotal evidence). A self-rating survey was conducted on all students; anonymously recorded student perception data, in class, were obtained prior to the course delivery. The course delivery was redesigned to positively influence the above intervention perceptions. The same survey was used to re-record post intervention perceptions. The results were compared through summary charts and statistical analysis. The intervention was a redesign of the first lesson which originally had been used to present the Learning Objectives, Method of Assessment and an introduction to the subject. These topics were represented/transformed to align with the motivation factors under study. The summary data on post-intervention feedback show that it had positively altered the perception of all four motivation factors. The data show that the number of students who perceived the subject as interesting went from 48.9 per cent to 75.8 per cent and as an aid to achieve targeted academic goals increased from 36.1 per cent to 42.5 per cent. The number of students who perceived the subject as an aid to was skills for life went from 40.4 per cent to 69.7 per cent. Similarly, the number who perceived the course as helpful for future career development went from 29.8 per cent to 54.5 per cent. This shows that the intervention had a positive impact on the motivation factors considered. Both research questions were answered affirmatively. A further study is required on the relative valence of motivation factors, selection criteria and prioritisation for intervention.

Purpose

The purpose of this study is to explore students' perceptions of key factors related to study motivation, which were ascertained before and after an intervention designed to alter them.

Motivation is the drive to learn, work and achieve goals and the behaviours that this energy and drive produce is in the student (Martin, 2002). It is also defined as "the willingness to attend and learn the material in a development program" (Cole *et al*., 2004). Considerable previous research has indicated that individual differences in motivation to learn are predictors of learning. Motivation to learn affects the processes that determine the direction,

the focus and the level of effort individuals spend in learning (Cole, Field, & Harris, 2004). The current higher education pedagogy and policy requires considerable out of class independent work to be performed by learners. New teaching approaches such as the flipped classroom rely on students undertaking considerable out of classwork and being motivated to do so independently (Abeysekera & Dawson, 2015). The course module which the author taught during the last semester, from the University of Westminster, required nine hours of independent study per week and the experience was that many students did not have the motivation to expend this effort. This is similar to the experience reported in Abeysekara and Dawson (2015), based on an Australian survey, which indicated that students spent only about 10 hours per week on an independent study across all subjects. Therefore, there is a compelling need to understand what motivates learning and design interventions to enhance learning.

Many theories and approaches to study motivation are available in the literature and the prominent among these are self-efficacy theory (self-determination), attribution theory, self-worth theory, the expectancy value theory, and the achievement goal theory. Theories of motivation are full of diversity and are derived from at least six major theories or perspectives (Seifert & Sutton, 2009). Though frequently presented alone these theories are tightly entangled with each other (Seifert, 2004). These theories are too complex to be applied by practitioners to design interventions, hence simpler models need to be derived. One such model found in literature is the "Boosters Mufflers and Guzzlers" approach, which is a simple separation of measures into factors that enhance motivation and academic resilience and those that reduce motivation and academic resilience (Martin, 2003). Martin (2002) states that this approach is a model for motivation rather than a model of motivation. These approaches demonstrate the possibility of creating a profile of a student, by selecting a suitable set of motivation factors, determining the measure of each such factor present in the student. In this paper the author has focused on one factor, the value of schooling, which is an indicator of how much value and meaning the student can attach to learning (Martin, 2001). This choice was reinforced by anecdotal evidence from conversations with parents of millennial generation students, lecturers, and from other popular literature where relevant factors and antecedent factors are derived.

Therefore, the following research questions were formulated:

RQ1: Can students be profiled according to the extent of each motivation factor present?

RQ2: Could motivation factors be changed by lecturer intervention?

Considering the time and other practical limitations, the following motivation factors (MFs) related to the value of schooling were selected:

Does the course help achieve targeted academic goals (i.e. to receive an honours degree) (MF2)? Does it help build skills for life (MF3) and be helpful for future career development (MF4)?

Methods

This study requires to develop a method to measure the "value of study" factors that students perceive in a course before the intervention, to design an intervention to alter that perception and to measure the perception again after the intervention. If the perception of the value of

study present in the course was increased by the intervention, then the intervention is positive. A self-rating survey using Google forms was conducted on all students; anonymously recorded student perception data, in class, were obtained prior to the course delivery. Table 1 shows how the questions in the self-rating survey were mapped to the motivation factors considered.

Table 1. *Mapping of Motivation Factor to Questions in Self Rating Survey*

Motivation Factor	Relevant Questions in Self Rating Survey
Students perceive the subject as interesting	Q1. Which response best describes your idea of this subject?
	Q2. Which response best describes your reason for doing this subject?
Students perceive the subject as an aid to achieve targeted academic goals	Q8. What is your view about the usefulness of this subject towards getting a good class in the degree?
Students perceive the subject as an aid to build skills for life	Q6. How useful is this subject in preparing you for your future life by building key skills?
Students perceive the subject as helpful for future career	Q5. What is your view about the usefulness of this subject for your career?

The intervention was redesigned for the first lesson which originally had been used to present the Learning Objectives, Method of Assessment and Introduction to the subject. These topics were represented and transformed to align with the motivation factors and Table 2 illustrates this. The same survey was administered to students to record student perceptions after the intervention. Data from both surveys were compared to observe the change in perception.

Table 2. *Intervention redesign for the first lesson*

Original Form of Presentation	Redesigned Form of Presentation
What this module is about?	Why should I study this module, with examples relating to modern applications in the world?
List of course Learning Objectives (LOs) presented	What subject related knowhow the industry requires when they graduate and how LOs facilitate building such skills.
List of key transferable skills	What skills will be needed for future employment and how the course helps to build them.
Assessment Method and implementation	Emphasis on how to achieve good grades and the assurance that the course is a steppingstone towards academic achievement.

Results

The percentage of students whose answers showed a positive perception of a motivation factor was calculated before and after the intervention. Table 3 summarises the change in perception which was captured by the post-intervention questionnaire.

Table 3**.** *Comparison of perception data before and after the intervention*

Motivation Factor	Relevant Question /Answer	Pre-Intervention Percentage of Students	Post Intervention Percentage of Students
Do the students perceive the subject as interesting	Q1, A1	48.9	75.8
	Q2, A4	25.5	39.4
An aid to achieve targeted academic goals	Q8, A4, and A5 cumulated	36.1	42.5
An aid to build skills for life	Q6, A3	40.4	69.7
As helpful for future career	Q5, A1	29.8	54.5

The data clearly show that the number of students who perceived the subject as an aid to achieving targeted academic goals increased from 36.1per cent to 42.5per cent. The number that perceived the subject as an aid to building skills for life increased from 40.4per cent to 69.7per cent. Similarly, the number that perceived the subject as helpful for future career advancement increased from 29.8per cent to 54.5per cent. This shows that the intervention succeeded in positively impacting these motivation factors. The biggest change observed is in the Q1, A1, which captures students' perception on "what the subject was all about" and the corresponding increase in Q2, A4 i.e. the perception "I am interested".

Conclusions

Students had answered both research questions affirmatively**.** The study reinforced the idea that motivation factors could be identified, and interventions could be designed and implemented at the course level. A further study is required on the relative valence of motivation factors, factor selection criteria and prioritisation for intervention. From a practitioner's point of view, this study can be useful in deriving a motivation process for the class. The steps briefly are to a) Identify the factors and sub-factors of motivation relevant to the course, b) conduct surveys/ measurements to determine the present status, c) design appropriate intervention, and d) re-assess the factors and sub-factors to determine success or failure of the intervention. The study also reinforces the idea that students could be profiled on a selected set of motivation factors, based on the degree of each motivation factor measured. The design and deployment of digital information systems to record and analyse the student profiles and automatically create groups of students with similar profiles in order to customise interventions are to be pursued. More precise and unobtrusive measurements of perceptions are needed. The use of modern information system approaches such as the Sentiment Analysis of the social media interactions of students can be considered to determine demotivators (e.g. Guzzlers as in Martin, 2002) and perceptions.

References

Abeysekera, L, & Dawson, P., (2015) Motivation and Cognitive Load in the Flipped Classroom: Definition, Rationale and a Call for Research*, Higher Education Research & Development*, 34(1), 1-14.

Cole, M. S., Field, H. S., & Harris, S. H., (2004) Student Learning Motivation and Psychological Hardiness: Interactive Effects on Students' Reactions to a Management Class, *Academy of Management Learning and Education*, 3(1), 64-85.

Martin, A. J. (2001) The Student Motivation Scale: A Tool for Measuring and Enhancing Motivation. *Australian Journal of Guidance and Counselling*, 11, 1-20.

Martin, A. J. (2002) Motivation and Academic Resilience: Developing a Model for Student Enhancement. *Australian Journal of Education*, 46(1), 34-49.

Martin, A. J. (2003) The Student Motivation Scale: Further Testing of an Instrument that Measures school Students' Motivation. *Australian Journal of Education*, 47(1), 88-106.

Seifert, K., & Sutton, R. (2009) Educational Psychology, Second Edition. Zurich: Global Text. Retrieved on July 13, 2019, from https://resources.saylor.org/wwwresources/archived/site/wp-content/uploads/2012/06/Educational-Psychology.pdf.

Seifert, T. (2004) Understanding student motivation. *Educational Research*, 46(2), 137-149, DOI: 10.1080/0013188042000222421.

Students' perception and preference towards selected student-centred teaching learning activities: A preliminary study

H.M.K. Akalanka
Department of Medical Laboratory Science, University of Ruhuna
kasuniakalanka@gmail.com

Abstract

Student-centred learning is recognised as one of the best ways of improving deep learning and understanding in students. However, most students entering tertiary education have practiced spoon-fed learning approaches during primary and secondary education in Sri Lanka. Thus, the study was designed to assess students' perception and preference on selected teaching-learning methods with the research question "which student-centred learning methods are preferred by students?".

The second-year students reading for the Medical Laboratory Science degree programme at the Faculty of Allied Health Sciences, University of Ruhuna were selected for the study. Students were taught different sub-topics in Biochemistry during the semester by conducting a lecture, using the active reading method, the active writing method, the Jigsaw method, and tutorial-based teaching method. At the end of the term, feedback was collected using a self-administered questionnaire. The students' preference was rated (0-20, 21-40, 41-60, 61-80, 81-100 percent) for each teaching methodology and extra space was provided in the questionnaire to collect any other comments and perceptions on each method.

Out of 23 students in the batch majority (91%, n=21) rated conducting merely a lecture as an ineffective way to enhance deep learning and understanding. Engaging students in active reading of recommended texts, and to make them present their learning, in groups of three, was rated as an interesting way of learning (96%, n=22). This gave them the opportunity to construct knowledge together and present it to their peers. Among teaching-learning activities given, learners preferred the Jigsaw Technique 72% (n=18), since could comprehend the given task during the time period. 20 students (87%) preferred leaning by problem-solving activities and tutorials to build confidence to face the Final Examination. The Active Writing Method which required students to produce a report on their learning was not rated as a popular activity. Many have expressed that giving time to prepare for special sub-topics and presenting their findings to peers helped improve their presentation skills, self-confidence and deep understanding of the concepts.

Background:

Majority of the students entering the tertiary education in Sri Lanka have practiced teacher-centred learning methods since childhood. Due to high competition to be selected to a local University, the students are used to being in a race, studying the taught lesson materials and facing examinations with less effort to explore further on the taught subjects. They usually passively receive the knowledge and information given by the teacher. Thus, the time a student spends thinking and researching on the subject has been reduced paving the way to lower the critical and analytical thinking abilities among most undergraduates. However, higher education has been transformed from the Industrial Age to the Information age and Dolence and Norris (1995) reports that the traditional classroom, seat time-based education,

has been changed to an environment where elements such as knowledge navigation, distance-free learning, fusion learning and work, and achievement-based outcomes are promoted. Teacher's main role has now become the role of a facilitator to help students develop their knowledge and skills.

The new paradigm of teaching requires educators to consider new meanings and methods of learning and teaching models that are suitable for a society of the modern information age. Thus, there is a wide range of teaching methods and tools introduced by many experienced educators. In the new paradigm, knowledge is constructed jointly by students and the facilitators, rather than being passive vessels to be filled by faculty knowledge; students in the new paradigm become active constructors and discoverers of knowledge (Arra, D'Antonio, & D'Antonio Jr., 2011). The role of the teachers is to develop student competencies. The relationship-building among the students and the staff is one key component in fostering cooperative learning and teamwork. In so doing, students will subsequently increase their interpersonal skills, an important skill required when they pursue further studies or enter the workforce.

Cooperative learning is also a type of a student-centred learning approach which requires students to work collaboratively in small, heterogeneous groups by helping each other to learn a given task or a learning objective (Arra et al., 2011). Over the years, research has found cooperative learning to be one of the instructional methods that can improve students' performance in contrast to individualistic learning (Aziz & Hossain, 2010).

The Jigsaw instructional method is a student-centred learning method (Aronson & Bridgeman, 1979) which is a highly structured cooperative learning method, originally created by Aronson, Stephan, Sikes, Blaney and Snapp, (1978). In the application of the Jigsaw Method, the teacher introduces a topic and its subtopics. The students are then divided into 'home' groups, where they are each given a different subtopic in the group. The next step requires the students to break out of their home groups to form the 'expert' groups where these students focus on one subtopic, researching and discussing it. Therefore, the students become experts on the subtopic that they have been assigned to. Following their discussion, the students from all 'expert' groups must return to the 'home' groups and brief the peers their findings and discussions. Eventually, all the members of the home groups will learn from each expert group discussion and will be benefited from each other.

Even though it is widely proven that the use of a single or multiple student-centred learning approaches improves deep learning and understanding, this approach is not widely practiced (Arra et al., 2011). Thus, this study was designed to assess students' perception and preference on selected teaching-learning activities with the research question being which student-centred learning method(s) is preferred by students among many teaching-learning approaches? The objective of the preliminary study was to assess students' perceptions and preferences on selected teaching-learning activities.

Methodology:

The second-year students reading for the Medical Laboratory Science degree programme at the Faculty of Allied Health Sciences, University of Ruhuna were selected for the study. Students were taught different sub-topics in Biochemistry during the same semester by using

several student-centred teaching methods. One lesson was conducted as a lecture in a teacher-centric manner. The lecture was conducted using a Power-point presentation with discussions with the students.

Another lesson was conducted using an active reading method where students were given relevant reading materials, followed by some questions to answer. The students those who were separated into groups of four had to actively read the material and be prepared to answer the questions; to present to their peer group. Students were also provided with referenced textbooks as reading material.

In the active writing method, students were assigned time to prepare a laboratory report based on the lesson studied. They were allowed to discuss prior to writing the report and a student selected randomly was asked to present it to the audience, and the report was corrected by the lecturer.

The jigsaw method was used as another teaching-learning activity. Students were categorised into groups of four and they were given four different sub-topics of the same lesson. The group was named as the homegroup. The students who were given the same subtopic were sent to one specialised group so that they all focused on the same objective and became specialists in the given area. After 30 mins of preparation time, students in the specialised groups were asked to report back to their home groups (i.e. their original group) and each member specialised in one area had to share their expertise among group members. Then two groups, randomly selected were requested to present their work.

As the fifth, teaching methodology questions were prepared and were given one week prior to the next teaching session. This teaching-learning activity was conducted as a tutorial. Students were randomly given the chance to read their answers and with their collective ideas, a complete answer was made. These students were assessed by their peers.

During these student-centred activities, the lecturer engaged with students asking questions moving from a lower cognitive level to a higher level, to help them construct new knowledge on the lesson discussed.

Student feedback and preferences on the five teaching-learning activities, based on a rating scheme of 0-20, 21-40, 41-60, 61-80 and 81-100 per cent were collected using a self-administered questionnaire. Extra space was provided in the questionnaire to provide written comments, and to provide responses on any information and perceptions on the teaching methodologies.

Results

Majority of students have assigned a higher score for student-centred learning activities (refer Table 1). Out of 23 students, a majority (91%, n=21) rated conducting merely a lecture as a non-effective (0-20%) way to enhance deep learning and understanding. Only one student had noted that conducting merely a lecture enhanced his deep learning. Engaging students in the active reading of referenced textbooks and make them present their learning in groups of three was rated 81-100 (96%, n=22). Majority commented that it would be an interesting way of learning as they were able to gather knowledge together and present them to their peers.

Table 1. *Students perception of selected teaching-learning activities*

Rating scale	A lecture only n (%)	Active reading n (%)	Active writing method n (%)	Jigsaw method n (%)	Tutorial based teaching n (%)
0-20	21 (91.0)	0 (0)	0 (0.0)	0 (0.0)	0 (0.0)
21-40	1 (4.3)	1 (4.3)	0 (0.0)	0 (0.0)	0 (0.0)
41-60	0 (0.0)	0 (0.0)	5 (22.0)	0 (0.0)	0 (0.0)
61-80	0 (0.0)	0 (0.0)	8 (34.9)	5 (21.7)	3 (13.0)
81-100	1 (4.3)	22 (95.6)	10 (43)	18 (78.3)	20 (87.0)

Among the used teaching-learning activities 78% (n=18) preferred the jigsaw technique and have rated 81-100; some have commented that this activity helped them to understand the lesson well. Among all, 20 students (87%) preferred leaning by problem-solving activities and tutorials (81-100%). Active writing of the laboratory report was not rated a popular learning activity. Many students have noted that giving them time to prepare for a special sub-topic to give time to prepare and present it to peers helped them to improve their presentation skills, self-confidence and deep understanding of the lesson. They have also stressed that peer-assisted active reading helped them in the learning.

Discussion and Conclusions

The results of the current study are consistent with the findings of many studies reported on the effective use of student-centred learning approaches (Brown, 1994). The students engaged in this study preferred active reading method and the jigsaw method than listening to a lecture or active writing. However, they expressed their liking towards tutorial-based learning method stating it helped them to build confidence in facing the examination.

Further studies incorporating other teaching-learning activities with a larger student population, at different levels will be conducted with the intention of sharing the teaching experience with other academic staff members and to actively involve students in teaching-learning activities.

References

Aronson, E., Stephan, C., Sikes, J., Blaney, N., & Snapp, M. (1978). *The Jigsaw Classroom*. Beverly Hills, California: Sage Publications.

Aronson, E., & Bridgeman, D. L. (1979). Jigsaw groups and the desegregated classroom: In pursuit of common goals. *Personality and Social Psychology Bulletin*, 5(4), 438-466.

Arra, C. T., D'Antonio, M. D., & D'Antonio Jr., M. (2011). Students' preferences for cooperative learning instructional approaches: Considerations for college teachers. *Journal of Research in Education*, 21, 114-126.

Aziz, Z., & Hossain, M. A. (2010). A Comparison of Cooperative Learning and Conventional Teaching on Students' Achievement in Secondary Mathematics, *Procedia. Social and Behavioural Sciences*, 9, 53-62.

Brown, A. L. (1994). "The advancement of learning". *Educational Researcher*, 23(8), 4-12.

Dolence, M. G., & Norris, D. M. (1995). *Transforming Higher Education: A Vision for Learning in the 21st Century. Society for College and University Planning*, Ann Arbor, MI: Society for College and University Planning.

Use of the first five-minute questioning as an Active Learning method for knowledge retention-enabled scaffolded higher learning

T. Sivakumar
Department of Transport & Logistics Management, University of Moratuwa
tsivakumar@uom.lk

Abstract

While knowledge retention is recognised as a necessary precursor for higher learning levels such as 'analysis', undergraduates were unable to answer classroom questions bridging concepts between modules from previous semesters and current module that however would have been enabled through the use of retained knowledge. Lack of 'retention of knowledge' existed regardless of their GPA. Students (n=49) were informed on the very first day about the perceived problem mentioned above and the following three changes intended to implement during the lectures: (a) Every lecture would commence with 5 minute of 'recalling' where students were asked to retrieve concepts from previous lectures from memory, without using their notes, textbooks or laptops; (b) 'recapturing' these concepts on a paper by 'thinking' individually (i.e. written on a piece of paper identified as the 'concept captured paper'); then 'pair' among table-mates (where missing concepts were noted using a different coloured pen), then the concept captured papers were collected and eventually discussed (i.e. 'shared') in class; (c) Every lecture would end with take-home questions to be discussed in the next class. The effectiveness of this method was evaluated based on (i) collected 'concept captured' papers at each lecture and (ii) student feedback collected at the end of the semester via an online Likert scale form and open-ended questions. Marking their 'concept captured' papers revealed that student improvement is significant (t-statistic = 2.28 and p = 0.028 (<0.05)) and their mean-mark improved by approximately 7 marks. Further, the online feedback questionnaire responses (n=37) showed that among the three methods, the 'think, pair, share exercise' was assessed by 49% as 'very effective'. There is strong evidence that this teaching intervention of the first five-minute questioning improves student marks significantly with a 95% confidence interval ranging from 0.8 to 13.2. This intervention was also found by students to be very effective in stimulating active learning for knowledge retrieval.

Background

While knowledge retention is recognised as a necessary precursor for higher learning such as 'analysis' in Bloom's Taxonomy, undergraduates were unable to answer classroom questions which bridge concepts between modules from previous semesters (i.e. pre-concepts) and current module (i.e. the new concept). Bridging pre-concepts with the new concept using retained knowledge is apt to gain higher competency levels as described in the SOLO Taxonomy (Biggs & Collis, 1982) by moving from the 'quantitative phase' (i.e. Pre-structural, Unistructural, and Multi-structural) to the 'qualitative phase' (i.e. Relational and Extended Abstract.

Lack of knowledge retention among students regardless of their GPA indicates that their learning style is not 'deep learning' but 'surface learning'. They do not attempt to comprehend the meaning of the subject as a whole but aim to learn just the facts they believed would be examined (Wormald, Schoeman, Somasunderam, & Penn, 2009).

Lieb (2012) stressed that students must retain information from classes to benefit from the learning and the role of the instructor is to assist learners in their knowledge retention. This research attempted to fulfil the need for 'knowledge retention' for higher learning. Therefore, the importance of long-term retention of knowledge was identified as the focus of this study. Since learning is 'construction of knowledge', it heavily depends on prior knowledge and experience since learners create new meaning using what they already know. Thus, the best predictor of what is learned at the end of any lesson is what the learner thinks and knows at the start of the experience. Therefore, it is of paramount importance to assess learners' knowledge and understanding at the start of every instructional encounter (Halpern & Hakel, 2014).

Methodology

Undergraduates students (n=49) from the STEM stream commenced their 14-week Semester 5 course during February 2019. There were informed on the very first day about the perceived issue, and that the teacher intends to implement the three suggested changes. The students were told the benefits of the suggested changes, in achieving an in-depth understanding of the course.

The lecture would commence with a 5-minute recall session where students were asked to retrieve concepts either learned in-class or from concepts constructed when working on homework questions given during a previous lecture, from memory, without using any learning resources. Students were given a minute to perform this activity.

By thinking individually, they were asked to recapture these concepts learnt in written form on the 'concept captured paper' during the next two minutes. Then they were asked to pair with tablemates to discuss and compare the response to identify any missing concepts. Students were requested to use a different coloured pen for this purpose, to distinguish between the response and the comments. The concept captured papers were then discussed (i.e. 'shared') in class.

During every lecture, a 'change-up' activity was introduced to discuss pre-set questions and student queries, and this was done in small groups. This would end with a 'take-home question' on inconclusive discussions and make students explore new ground on a continuing topic. Take-home questions are discussed during the first five minutes during the next lecture. The lesson plan had introduced a 'change-up' activity, during the lecture break given after about 20 minutes of lecture time, considering the attention span of students (Middendor & Kalish, 1996).

The concept captured papers collected during a lecture were evaluated to assess its effectiveness as a good practice. Student feedback on this intervention was also collected using an online questionnaire form, consisting of questions based on the Likert scale and open-ended questions.

Results

The statistical analysis of the graded concept captured papers showed a significant improvement in deep learning (t-statistic = 2.28 and $p = 0.028$ (<0.05). Tables 1 and 2 summarise these findings. The mean-mark has improved approximately by 7 points and the

shift of the mean towards the right, due to a significant number of high performing scores was observed (refer Figure 1). It also depicts that the effect is mostly from the low and middle performers.

Table 1. *Paired Samples Statistics of 'before' and 'after' the intervention*

Statistics	Mean	N	Std. Deviation	Std. Error Mean
After intervention	61.820	39	13.149	2.105
Before intervention	54.820	39	18.343	2.937

Table 2. *Paired Samples Statistics of difference between 'before' and 'after' the intervention*

Statistics	Mean	Standard Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	σ (2-tailed)
				Lower	Upper			
After - Before	7.000	19.115	3.061	0.804	13.196	2.287	38	0.028

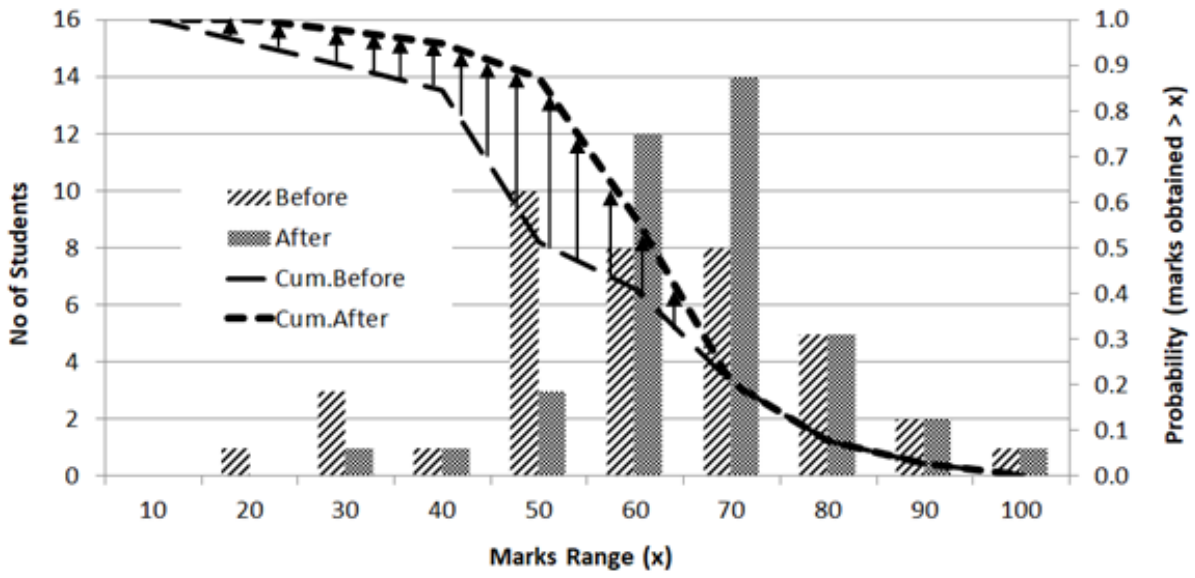


Figure 1. Students count and probability VS marks

The responses from the online feedback questionnaire (n=37) show that among the three approaches introduced, the 'think, pair, and share' change was assessed by 49% as 'very effective' (refer Figure 2). It also showed that all three approaches were perceived to be effective, with ratings of 3 or above, out of 5. Figure 3 shows a sample response received on an open-ended question given in the online questionnaire.

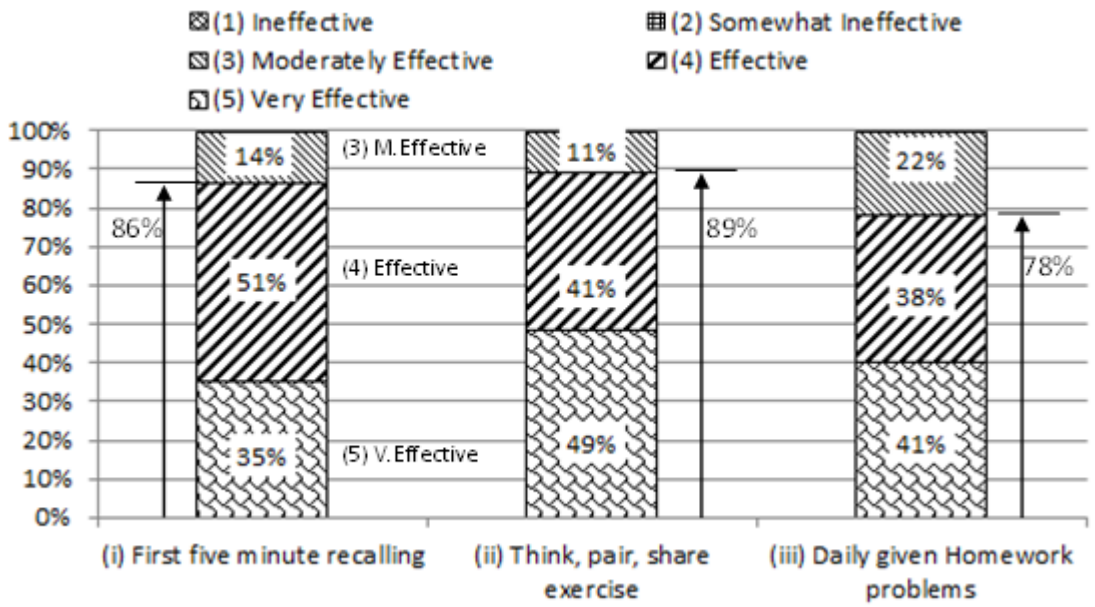


*Figure 2***.** Effectiveness of those three new approaches experimented

What aspects of this new approach were the most useful or valuable to you?

"All. Homework questions made me search for things I usually wouldn't. Recalling the last lecture made me go through the previous day notes before the lecture which I only did continuously for this lecture. The individual and group activities brought out different ways of thinking"

*Figure 3***.** A sample reflection of students

Conclusion

There is strong evidence to show that the intervention of first five-minute questioning along with the other two supportive approaches like 'think-pair-share' teamwork and 'continuous engagement' as an effective intervention to improve student performance. This study also finds that this intervention is perceived as positive by most students. Students have highlighted the need to introduce more teaching-learning activities.

The author wishes to study long-term knowledge retention among the same cohort of students during the next semester.

References

Biggs, J. B., & Collis, F. K. (1982). *Evaluating the Quality of Learning: The SOLO Taxonomy.* New York, NY: Academic Press.

Halpern, D. F., & Hakel, M. D. (2014). The University and Beyond: Teaching for Long-Term Retention and Transfer. *University of Pittsburg Teaching Times*. Retrieved on June 6, 2019 from http://www.cogsci.rpi.edu/public_html/heuveb/teaching/Halpern%20&%20Hakel.pdf.

Lieb, S. (2012). *Principles of Adult Learning.* Vision – South Mountain Community College

Phoenix, AZ, retrieved on June 6, 2019, from https://petsalliance.org/sites /petsalliance.org/files/Lieb%201991%20Adult%20Learning%20Principles.pdf.

Middendor, J., & Kalish, A. (1996). The “change-up” in lectures. *National Teaching and Learning Forum*, 5(2), 1-5. Retrieved on June 2, 2019, from http://www.iub.edu /~tchsotl/part3/Middendorf%20&%20Kalish.pdf, Indiana University.

Wormald, B. W., Schoeman, S., Somasunderam, A., & Penn, M. (2009). Assessment Drives Learning: An Unavoidable Truth, *Anatomical Sciences Education*, 2(5), 199-204, Retrieved on June 6, 2019, from Researchgate.

Students' perception on transformation of a teacher centred undergraduate class to an active learning platform

W.A.J.S. Wickramasinghe
Department of Nuclear Science, University of Colombo
jivendrasw@gmail.com

Abstract

It has been observed that the students' interest in a given lecture tends to reduce during the sections with theoretical aspects. At the end of the course, students work hard to memorise all the theories for the final examination only to forget everything immediately afterward. This teacher-centred practice produces graduates with lower-order thinking skills, thereby reducing the quality of learning. Hence the objective of the teacher should be to increase the attention span of students and to engage them to practice active learning. This study describes an intervention where first, printed copies of the lecture note with blank spaces were given to the students, which they had to complete themselves. Secondly, group activities for the relevant unit were developed and introduced where students were expected to carry out, with the problem statement explaining the underlying theory. The story-telling method was adopted to the units where the previously described strategy was not applicable. To check the effectiveness of these interventions, students were asked to draw a mind map on their learning during the preceding lecture. Moreover, a specific format for the student feedback form was designed and was adapted with the authorisation of the Head of the Department as the prevailing format did not cater to the requirements of the lecturer. All feedback was positive and several students went one step further to suggest the inclusion of video clips and pictures. The lecture format was changed as per the feedback received from students. This has increased the attention span of the students and hence their interest in the subject. In conclusion, students had gained knowledge on the subject by actively engaging in the lecture rather than expressing the facts verbatim.

Background

The traditional method of teaching is characterised by a group of students seated in a classroom listening quietly to the teacher who stands in front explaining what he/she knows. This archaic model of teacher-centred education (TCE), assumes a linear educational process where information is transferred directly via language. One of the main features in this system is that the student is not expected to take any action or responsibility regarding their learning until the final examination (Catalano and Catalano, 1999). Many teachers focus on explaining the content in class, assuming that students were similar to tape recorders, can absorb information simply through listening, seeing or recording while other teachers would focus on what they do in the classroom to make the students interpret the information to create new knowledge (Biggs & Tang, 2007). In both scenarios, if the students were to become passive participants in the learning process, as is in the TCE model, they will fail to process the data they receive. In order to gain knowledge, students should be allowed to play with and connect the information they receive with the concepts they already know (Biggs & Tang, 2007; Gibbs & Habeshaw, 1989).

It has been observed that the students' interest in a lecture reduces greatly due to the presence of a significant amount of facts and forty-five information resulting in surface

learning and more of memorising. As Gibbs and Habeshaw (1989) explained, students naturally prefer to memorise all data given in a lecture rather than attempting to understand the information, hoping to succeed at the final examination. What is commonly termed as '*memorising versus understanding*' is described in Biggs and Tang (2007) as "*surface versus deep learning".* Students who apply the surface learning approach, use low cognitive-level activities and focus on 'signs' of learning such as words and isolated facts. Hence, they fail to see the meaning and the structure of what they were taught. It is difficult to stop the negative feelings such as boredom and anxiety arising when students only see a bulk of facts with no connection. Studies suggest that boredom has become a significant issue in higher education as more than 50% of the university students face boredom in classrooms. At length, the TCE model encourages students to employ the surface learning approach, produce high rates of college dropouts or graduates with lower-order thinking skills (Rosegard & Wilson, 2013). To change this trend and improve the quality of teaching and learning the teacher has to adopt a student-centered education model, which facilitates deep learning among students.

Providing an external stimulus that could capture the student's attention and allowing them to engage in learning activities that are built on their prior knowledge, are proven practices that increase students' interest as well as knowledge on subject matters. When the teaching factors such as explicit teaching, constructive alignment of teaching and assessment and stimulating responses from students is coupled with student factors such as appropriate background knowledge, ability to focus and intention to engage in learning tasks meaningfully, triggers learning among students. An initial memory is formed in students' mind which they are able to process further (Biggs & Tang, 2007; Rosegard & Wilson, 2013). Carefully planned learning activities could be used in between a lecture as perfect stimuli to capture student attention and to trigger long-term memory. Keeping in mind that average attention span of a student is suggested to be 15 – 20 minutes, the lecture could be planned with theoretical sessions where the teacher does the explanations and practical sessions where the students work, coupled in together (Davis, 1993; Gibbs & Habeshaw, 1989).

This study is focused on increasing the students' attention by enabling students to engage in learning activities.

Method

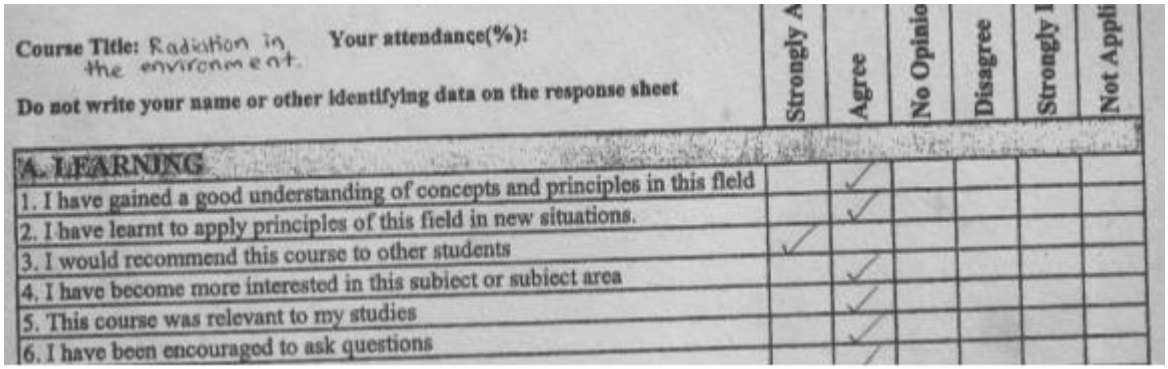
The study focused on a lecture series consisted of forty-five (45) lecture hours. Students were given an incomplete handout with blank spaces during the first six lectures. However, upon observing students being too focused on completing the notes rather than on the lecture, the lecturer decided to upload a summary note of the lecture to the Learning Management System (LMS) starting from the seventh lecture onwards. Students were instructed to download and/or print the handouts before they come to the lecture and were instructed how to prepare their own notes based on the incomplete handout. This practice was continued throughout the lecture series as it facilitated the group activities and story-telling method the lecturer had planned.

To improve the students' understanding of the theory note, group activities on problem-solving scenarios were implemented; question sets on specific lectures were introduced. Students were also instructed on time allocations, presentations and resource materials to used, before commencement of each activity. Lecturer walked around the entire class during

these activities spending time with every group responding to students' questions. These questions were used to initiate discussions and to explain theories based on students' prior knowledge and their reflections on recent learning activities while spending less effort and time. For the sections where the group activities were not suitable, the story-telling method was adopted. The whole theory was explained as a story while drawing upon real-life examples from day to day activities or current affairs. Either the group activity or the storytelling method was used in each lecture depending on the suitability with regard to the topic of the lecture.

The effectiveness of these methods was measured by the students' perceptions received via feedback forms and by their ability to draw precise mind maps, independently. Mind maps sketched by the students during each lecture was an indicator of students' understanding of its content. After the initial introduction of the mind maps, students were given the full responsibility of working out their own maps. The lecturer walked around the entire class giving feedback and guidance.

The feedback forms used at first did not have a feature for the students to express their thoughts on the lecture. Therefore during the first year of teaching, the lecturer provided the students with a blank sheet of paper along with the feedback form and asked the students to write their thoughts freely at the end of the lecture series. Figure 1(a) and 1(b) shows sample feedback and the comment sheet students had completed.



Course Title: Radiation in the environment. **Your attendance(%):**

Do not write your name or other identifying data on the response sheet

	Strongly A	Agree	No Opinio	Disagree	Strongly I	Not Appli
A. LEARNING						
1. I have gained a good understanding of concepts and principles in this field		✓				
2. I have learnt to apply principles of this field in new situations.		✓				
3. I would recommend this course to other students	✓					
4. I have become more interested in this subject or subject area		✓				
5. This course was relevant to my studies		✓				
6. I have been encouraged to ask questions		✓				

Figure 1(a). Old version of feedback form

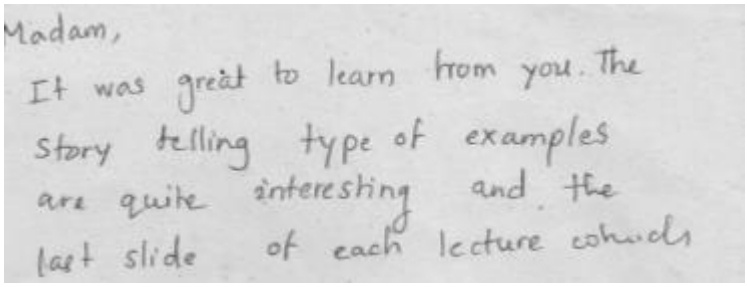


Figure 1(b). A blank sheet filled by a student

In later years, the student feedback form was modified and adapted with the authorisation of the Head of the Department. Figure 2 shows a student's response to a specific question given in the modified feedback form.

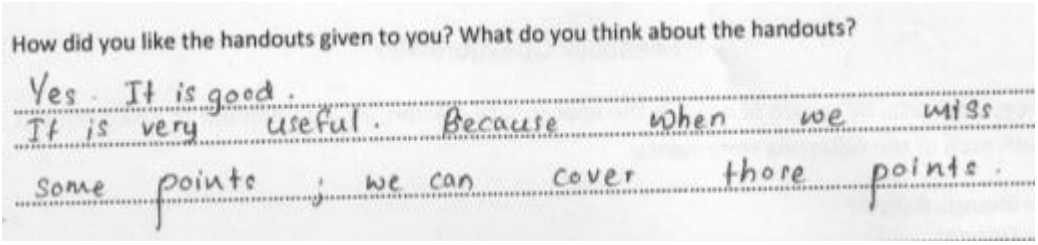


Figure 2. A specific question given in the modified feedback form

Results:

Students' feedback on the methods used was collected from all sixty students in the class. 37 students had provided written responses for the questions on specific sections. All the 37 students expressed (100% as a percentage) positive thoughts on the handouts and the group activities although the lecturer observed that the summary note uploaded to the LMS was more effective than the incomplete handout. Comments were given by the students and the number of students (as a percentage) are summarised in Table 1.

Table 1. *Summary of student feedback*

Section	Comment	Number of students as a percentage (%)
Handouts	Very well focused on what the lecturer explained	17
	Easier to handle than attempting to take down notes on the slides while listening to the lecturer	17
	Blank spaces helped to keep focused on the lecture more	2
	Handouts uploaded into LMS made it easier to note down the important facts in the lecture. A great help in building a relationship between the lecture and the note.	14
Explanations given by the lecturer	Very interesting and clear	63
	Caught attention throughout the lecture	17
Lecture as a whole	Well planned, very well conducted and managed with a good flow which made it easier to understand the contents and make connections which had made it easier to remember than memorise the facts	57
	Lecture series became the most interesting one of all lectures	43

Students agreed that the story-telling method, mind mapping and other group activities made the lecture more active and less boring while allowing them to build a close relationship with the lecturer. Over the semester, slowly but effectively, even the students who were less active in the class had learned to share their questions, doubts, and views during these activities. The students expressed that the encouragement given by the lecturer to ask questions and discuss their doubts and views have made it easier to grasp the lecture better. Few students took one step further and suggested to the lecturer to add more questions, videos, and pictures to improve the lecture.

In the beginning, students made mistakes and were reluctant to work alone on the mind maps. However, when the lecturer accepted their versions of maps and discussed on how to improve on their mistakes, they were willing to draw and show what they thought was correct. By the end of the semester, the students were able to draw mind maps that depicted what they had learned during the previous lecture. Students' ability to make clear and valid connections between the theoretical facts discussed during the previous lectures, proved that they had understood the lecture not as a collection of facts but as a single concept.

Discussion and Conclusions:

Although handouts saved time and reduced dozing off in the class, students were more focused on completing the blanks rather than the lecture. Students failed to understand the flow of the lecture and hence attempted to memorise facts. The handouts were only facilitating surface learning in students. Uploading a lecture summary to the LMS and conducting group activities proved very effective in preventing surface learning when used in sync. Students made an effort to grasp and relate to the contents discussed in the lectures. This improvement was observed in the mind maps they drew, the questions they asked, and, in the discussions, they had with the lecturer. Students were able to gain knowledge on the subject by taking a deep learning approach.

The group activities and the mind maps were excellent stimuli in sustaining students' attention throughout the lecture while providing an opportunity to build a closer relationship with the teacher. The lecturer focused on what the student did and facilitated their learning, rather than focusing on what the lecturer was doing to make them understand the content. The class had moved from being a teacher-centred class to a more student-centered platform where students were actively engaged in learning.

This study will be continued to evaluate the effect of the constructive alignment of teaching and assessment in enhancing students' attention and understanding of the lecture in achieving the learning outcomes.

References:

Biggs, J., & Tang, C. (2007). *Teaching for Quality Learning at University: What the student does* (3rd Ed.). Berkshire, England: Open University Press.

Catalano, G. D., & Catalano, K. (1999). Transformation: From Teacher-Centered to Student-Centered Engineering Education. *Journal of Engineering Education*, *88*(1), 59–64. https://doi.org/10.1002/j.2168-9830.1999.tb00412.x.

Davis, B. G. (1993). *Tools for Teaching* (1st Ed.). California: JOSSEY-BASS Publishers.

Gibbs, G., & Habeshaw, T. (1989). *Preparing to Teach: An Introduction to Effective Teaching in Higher Education* (2nd Ed.). Bristol, England: Technical and Educational Services Limited.

Rosegard, E., & Wilson, J. (2013). Capturing students' attention: An empirical study. *Journal of the Scholarship of Teaching and Learning*, 13(5), 1–20.

Increasing improvement in Business English Vocabulary using blended delivery mode compared to online and face-to-face delivery

R.P. Dharmawardene
Department of English Language Teaching, University of Colombo
ruwini@delt.cmb.ac.lk
T.A. Weerasinghe
University of Colombo, School of Computing (UCSC)
taw@ucsc.cmb.ac.lk

Abstract

As adult English language learners enrolling in the one-year Business English Diploma course at the Faculty of Arts in the University of Colombo find it challenging to achieve the outcome of improving English business vocabulary, we explored whether different delivery modes (of face to face, online and blended) influenced this outcome achievement. Three tutors of English taught the same content to three groups of students using face-to-face, online and blended modes over 3 months in the Department of English Language Teaching at the University of Colombo. With the face to face mode continuing as a control group (n=15), the blended (n=15) and online (n=15) groups received six online modules and four quizzes on vocabulary. While the online group received all lessons and quizzes online with no face to face instructions, the blended group received 70% of the course materials online with six face to face lessons to cover up the balance 30% of the course modules. The control group too received the same vocabulary learning lesson materials and practiced these only in their face to face classes. While the three groups showed the performance as Blended mean score =43.07, Online mean score =39.27, Face to face mean score =45.00 at the pre-test having sixty fill in the blank questions in dialogue completion, the course-end test (of sixty fill in the blank questions in a similar dialogue completion exercise) showed the blended group participants to have scored significantly increased marks (mean score =51.20, t=-7.176, p=.000), compared to their counterparts (Online mean score =47.60, t= -5.593, p=.000, Face to face mean score =50.67, t= -5.330, p=000) at the significance level of $p < .005$. This study, with further confirmatory evidence, can have implications for teaching Business English vocabulary in the context of teaching English as a second language in higher education.

Background

Although technology-aided instruction can contribute to the improvement of English as a Second Language (ESL) students' proficiency (Lizzio, Wilson, & Simons, 2002), the traditional face-to-face teaching is still reported to be able to outperform online teaching because it attracts and creates interest in students (Garson, 1998). However, according to Driscoll (2002) blended learning mode, a mode of delivery that combines online digital media with traditional classroom method can be successfully applied in adult's learning in many disciplines.

Learning Business English has become crucial for working adults in Sri Lanka at present than at any other time. Although some business professionals are with great abilities and intelligence, they are usually judged in their society on how well they speak and write in English. Targeting working adults, many Universities in Sri Lanka have started offering weekend Business English courses. Many of those courses are designed to equip adult

students with business communication skills and expect students to improve their business vocabulary. Most of those courses are conducted in the face-to-face mode in traditional classroom settings while a few of them are conducted in fully online mode. This study investigated how effective it would be if the blended mode of delivery was introduced instead of fully online or face-to-face courses in teaching business English vocabulary to adult learners in the Sri Lankan University system.

Methodology

The main objective of this study was to compare adult students' performance in using correct business vocabulary in blended learning (BL), face to face and online modes of delivery. The setting was made at the Department of English Language Teaching (DELT) at the faculty of Arts in the University of Colombo (UOC). The sample of this study consisted of 45 students, both male and female, (age: 21 to 54 years) who were randomly selected from the students who passed the placement test and registered to follow the online Diploma in Business English course for the year 2018 at the DELT, Faculty of Arts, UOC, Sri Lanka. The students were randomly assigned into three groups and instructed to complete six-course modules of vocabulary in three different modes of learning, blended, face-to-face and online over three months (refer Table 1).

Table 1**.** *Strategies used to teach the three groups*

Study Group	Strategy utilised in teaching vocabulary		
	Course Content	Practicing materials	Assessment criteria
Online	Six modules on vocabulary learning and a lecture note on effective communication skills were uploaded to the LMS. No face to face instructions were given. Access for all materials uploaded to the LMS was granted for all participants.	Four online quizzes and six online activities on vocabulary practicing. Six online modules on writing with new vocabulary and dialogue completion. Online chatting with the tutor.	Pre and post-test which included 60 questions on correct vocabulary usage. Tests were conducted in the regular classroom.
Blended	Six lectures face to face on vocabulary development, each two hours duration. LMS access was given to follow 70 percent of the course materials uploaded. The rest was to be studied in the face to face classroom.	Four online quizzes and six online activities on vocabulary practicing. Six online modules on writing with new vocabulary and dialogue completion. Online chatting with the tutor.	Pre and post-test which included 60 questions on correct vocabulary usage. Tests were conducted in the regular classroom.
Face to face	Six modules on vocabulary learning were taught in the class. A lecture on effective communication skills was delivered in the face to face class. No online access was given to the participants.	Four online quizzes and six online activities on vocabulary practice were conducted in the class using printed handouts. Six modules on writing with new vocabulary and dialogue completion were also done using printed materials in the face to face mode.	Pre and post-test which included 60 questions on correct vocabulary usage. Tests were conducted in the regular classroom.

The online and blended learning courses were delivered using a Moodle-based Learning Management System (LMS). The same online exercises on vocabulary were distributed in print version to the participants in the face to face mode. The entirely online group studied the content online and they were not given instructions in a physical learning environment. BL group followed 70% of the course units online and the balance 30% in their face to face classrooms.

Three Tutors of English who have a similar level of experience in teaching with the same educational qualifications were assigned to teach to three groups of students. The researcher hypothesised the same level of outcome from all three groups at the end of the course. The data was analysed using independent t-tests and two-tailed t-test in SPSS Version 20.0.

Results

Paired t-Test was utilised to compare the pre-test scores of the blended group (BLpre) with the post-test scores of the same group (BLpost), the pre-test scores of the online group (OLpre) with the post-test scores of the same group (OLpost) and the pre-test scores of the face to face group (F2Fpre) with the post-test scores of the same (F2Fpost).

The study results show that there is a significant difference between the mean scores of the pre and post tests conducted for each group of participants (Blended mode= 8.133, Online mode=7.400, face to face mode=5.667). However, the improvement of the participants who learned business vocabulary through the mode of blended learning was the highest (Mean = 8.133) compared to their counterparts.

Table 2. *Paired Samples t-Test results comparing vocabulary learning performance of blended, online and face to face groups*

Pairs		Paired Differences					t	df	σ 2-tailed
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BLpre - BLpost	-8.133	4.389	1.133	-10.564	-5.703	-7.176	14	.000
Pair 2	OLpre - OLpost	-7.400	5.124	1.323	-10.238	-4.562	-5.593	14	.000
Pair 3	F2Fpre - F2Fpost	-5.667	4.117	1.063	-7.947	-3.387	-5.330	14	.000

Significance level p < .005

The result of this study is contradictory to the results presented by Adam et al (2015) after studying two sections of an introductory microbiology course that was taught in hybrid and traditional methods. In his study, one section was taught through a hybrid (BL) format and the other through a traditional (face to face) format. Students were randomly assigned to the two sections. Both sections were provided with identical lecture materials, in-class worksheets, in-class assessments, and extra credit opportunities; the main difference was in the way the lecture material was delivered-online for the hybrid section and in person for the traditional section. Analysis of final grades of his study revealed that students in the

traditional section did significantly better than those in the hybrid section ($p<0.001$) which shows the opposite results of the present study.

When performance in the two sections of Adam's study was compared for each class year separately, the differences were only significant for second years ($p<0.001$); freshmen, juniors, and seniors did not perform differently in the hybrid versus the traditional section. An anonymous midterm survey had suggested factors are likely contributing to the overall lower success of students in the hybrid section: some students in the hybrid section had not taken lecture notes and/or use the audio component of the online lectures, suggesting minimal interaction with the lecture material for these students. However, in the present study, participants in the blended group were keen on attending face to face classes while actively interacting with their peers and Tutors online.

However, one of the most recent studies conducted to see the effectiveness of using the blended mode instead of the traditional face to face mode in teaching Science, Technology, Engineering, and Mathematics education with pre-university science students in Canada (Bazelais, 2018) shows the similar results to that of the present study. It reveals that the students in the blended group perform significantly better than their counterparts.

Discussion and Conclusions

The findings of the study provide evidence to prove the fact that the blended mode can be successfully used to support students to improve their business English vocabulary. The results of this study will be of use to the authorities of Higher Educational Institutes including Universities that expect to commence or continue Business English courses in the blended mode of delivery. In addition, through the findings of this study, the future adult students who wish to upgrade their knowledge in business English Vocabulary by following an English course in blended mode would be highly benefitted. The same study can be replicated in a different setting at a different time or for different subjects in order to compare the outcome of different pedagogies. Raw data were generated at the University of Colombo in Sri Lanka. Derived data supporting the findings of this study are available from the corresponding author on request.

References

Adams, A. E. M., Randall, S. and Traustadottir, T. (2015). A Tale of Two Sections: An Experiment to Compare the Effectiveness of a Hybrid versus a Traditional Lecture Format in Introductory Microbiology. *CBE–Life Sciences Education*, 14, 1-8.

Bazelais, P., Doleck, T., & Lemay, D. J. (2018). Investigating the predictive power of TAM: A case study of CEGEP students' intentions to use online learning technologies. *Education and Information Technologies*, 23(1), 93-111.

Driscoll, M. (2002) Blended Learning: Let's Get beyond the Hype. IBM Global Services. http://www-07.ibm.com/services/pdf/blended_learning.pdf.

Garson, G. (1998). Evaluating and implementation of web-based teaching in political science. *Political Science and Politics*, 31(3), 585-590.

Lizzio, A., Wilson, K., & Simons, R. (2002). University Students' Perceptions of the Learning Environment and Academic Outcomes: Implications for Theory and Practice. *Studies in Higher Education*, 27, 27-52, DOI: 10.1080/03075070120099359.

Paul, B., Tenzin, D., & David, J. L. (2018). Investigating the predictive power of TAM: A case study of CEGEP students' intentions to use online learning technologies. *Education and Information Technologies*, 23(1), 93-111.

Learner engagement at the pre-laboratory activity and its effectiveness towards successful course completion

H.G.P.A. Ratnaweera

Department of Civil Engineering, The Open University of Sri Lanka

pratnaweera@yahoo.com

Abstract

Soil Mechanics and Introduction to Rock Mechanics course of the Bachelor of Technology (Civil) programme at OUSL has eight laboratory activities, performed by learners in small groups. These activities are part of Continuous Assessment (CA) and are assessed based on results and calculations submitted, and by a viva-voce examination held towards the end of the academic year. Lack of learner preparedness and engagement in preparatory, during and post-laboratory stages had previously resulted in many learners being unsuccessful (33.6 per cent in 2016-17) in passing the laboratory component. The pre-laboratory activity, which was not made obligatory, was designed mainly to test prior knowledge required, where learners are expected to submit responses to an open online forum thread. Though this was designed as a formative learning activity, some learners copy-pasted from others and many did not respond prior to commencement of the group activity. About 155 learners had performed the laboratory activity during 2017-18. They were subjected to group-based peer-Socratic questioning on their prior-knowledge, procedures to follow, and basic concepts. This compelled them to engage in collaborative learning to gain necessary know-how prior to the activity. Lack of preparedness for self-study resulted in learners spending 2-4 days more to complete this group activity, hence it was important to study whether improved learner engagement and hence improved performance are achievable via the pre-laboratory activity. This study had students undertaking the above-described activities, to investigate whether the timely submission of the pre-laboratory activity enhanced learner engagement in the laboratory activity, post-laboratory work, overall performance at CA and the Final Examination. From among the learners who have completed 7-8 pre-laboratory activities prior to the laboratory activity, 75.4 per cent, 60.9 per cent and 43.5 per cent have been successful in completing the laboratory activity, the Continuous Assessment and the Final Examination, respectively. 39.1 per cent have deferred sitting the final examination. The results conclude that timely student engagement in the pre-laboratory activity increased the effectiveness of the laboratory activity and course performance completion.

Purpose

Soil Mechanics and Introduction to Rock Mechanics course of the Bachelor of Technology (Civil) programme at OUSL has eight laboratory activities. These activities are performed by learners, in small groups of 5-8. The laboratory activity is part of Continuous Assessment (CA), and the CA comprises of three (3) Tutor Marked Assignments (TMAs), two (2) Continuous Assessment Tests (CATs), Reflective Learning Log (RLL) submissions, and a compulsory Laboratory Activity (LAB). The prescribed CA criteria is $AVG(TMA)\times0.25+AVG(CAT)\times0.25+AVG(LAB)\times0.4+AVG(RLL)\times0.1 \geq 40$ and $AVG(LAB) \geq 40$. The Laboratory Activity is assessed based on a performance mark (i.e. 40 per cent for the group activity, computations, and results) and a viva-voce examination (60 per cent) that is held towards the

end of the academic year. During 2017-18 academic year of 341 enrollments, 155 learners (i.e. 45.5 per cent) performed the laboratory activity; 24 (i.e. 7.9 per cent) were permitted to carry over their laboratory grade (i.e. ≥ 40 per cent) to the current academic year; 52 (i.e. 15.2 per cent) were exempted from the activity, however, were required to face the viva-voce assessment; and 110 (i.e. 31.4 per cent) had "dropped out" from the course. Some learners who dropped-out may later re-enroll in the course.

During the Academic Year 2017-18, the study period spanned over 44 weeks, with a 9-week closure of the University. The six laboratory sessions were scheduled at 5 per cent, 37 per cent, 45 per cent, 55 per cent, 64 per cent, and 73 per cent from the start date of the 44-week period. Figure 1 shows the performance of 155 learners enrolled in laboratory sessions, completing the three assessment stages during the Academic Year 2017-18. The per cent difference between the 1st and the 2nd attributes represents learners who have either failed to pass the laboratory activity, mainly being unsuccessful at the viva-voce examination or those who have done poorly at TMAs, CATs, and RLLs. The per cent difference between the 2nd and the 3rd attributes represents learners who were unsuccessful at the final examination and those who had opted to sit the final examination during the next attempt. The findings do not show a trend where Group CLE01 benefiting from the head start, or latter groups (i.e. CLE04 – CLE06) benefitting from the learning curve. Groups CLE02 and CLE03 are above the others based on the number enrolled (i.e. n = 36) and their overall success. The low overall performance observed in CLE04 may have resulted from the loss of engagement while the upward trend observed in CLE05 and CLE06 can be attributed to late success and motivation.

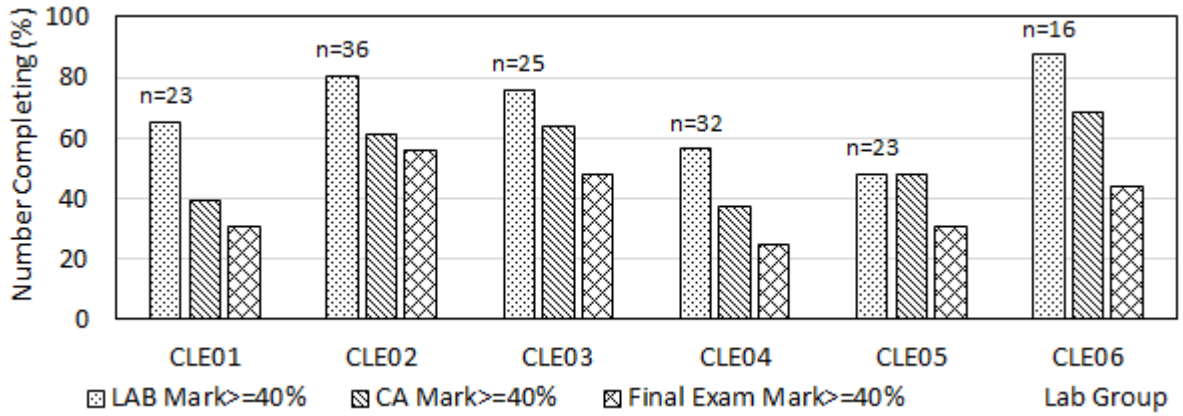


Figure 1. Per cent Learners completing the three assessment stages, Acad. Year. 2017-18.

During the Academic Year 2011-12, a group-based peer-Socratic questioning was introduced prior to the laboratory activity to ensure that each sub-group possesses the prior-knowledge to perform the activity; able to explain the underlying concepts; to know the computational needs and the expected outcomes. Paul and Elder (2008) classifies Socratic questioning as Spontaneous or Unplanned, Exploratory, and Focused. A random learner is posed with a spontaneous question on declarative knowledge, followed by more focused exploratory questions. When a futile response is made, learners are compelled to engage in collaborative learning to gain necessary know-how through peer support and to use the prescribed Self-Instructional Study Material effectively. When a satisfactory response is given, probing is continued with another learner. The learning curve of each sub-group is observed to improve during the activity, indicating an improvement in 'learning to learn' skills. However, in 2016-

17, 28.6 per cent of learners who enrolled to do the laboratory activity were unsuccessful in passing, due to incorrect and/or incomplete computations or being unable to explain the work performed by the group, during the viva-voce examination.

During the Academic Year 2016-17, an on-line pre-laboratory activity based on YouTube video demonstration clips was introduced to improve learner preparedness. The pre-laboratory activity, which wasn't made obligatory, was designed mainly to focus learner attention to prior learning, and they were expected to submit responses to an open online forum thread. Though this was designed as a formative learning activity, some learners copy-pasted from others and many did not respond prior to the stipulated deadline. Black and William (1998) states that "… for effective formative assessment to take place, research suggests that teachers need to develop adaptive expertise—a short-cycle adaptation of teaching to meet the needs of the students …". This, however, remains a challenge in an ODL environment. The ODL learners are afflicted with lack of time to devout towards continuous learning, inadequacies in self-learning skills, lack of knowledge from prior learning and intrinsic motivation. Learners are expected to develop such skills and attitudes through teacher-learner interactions; 'teaching' shouldn't be limited to the mere transfer of information.

This study had students undertake the above-described activities, to investigate whether the timely submission of the pre-laboratory activity enhanced learner engagement in the laboratory and post-laboratory activities, performance at CA and the Final Examination.

Methodology

The pre-laboratory assignment was based on 8 activities posted to the Virtual Learning Environment Edu2.0. Learner responses were categorised based on the date of submission of each activity as submitted prior to the activity (i.e. up to and including the day before commencing the activity), during the activity (i.e. up to the date of submission of the report – 35 days since commencement date) and after the activity (i.e. until the viva-voce examination date). The average number of days from the pre-laboratory activity due date was computed based on individual submission dates of activities submitted. Learners were grouped into four categories based on those who have submitted 7-8; 4-6; 1-3 and zero pre-laboratory activities. The date of submission of the pre-laboratory activity was used as an index to compare learner success at the Laboratory Activity stage, CA stage and the Final Examination stage.

Results

Figures 2 through 5 plot the mean mark and its standard deviation received for the Laboratory Activity, Continuous Assessment and the Final Examination, respectively. The shaded regions show the marks received by successful learners (i.e. $\geq$ 40 per cent). The symbols depict the mean values of the three cohorts of the population while the dotted regions show their Standard Deviations. The plots show that from among those who have completed 7-8 pre-laboratory activities (i.e. n=119) and out of those who had submitted prior to the activity (i.e. n=69), 75.4 per cent (i.e. n=52), 60.9 per cent (i.e. n=42) and 43.5 per cent (i.e. n=30) have successfully completed the respective three stages of assessments.

39.1 per cent (i.e. n=27) had differed sitting the final examination, hoping to better their grades during the next sitting. The respective figures for those who have submitted the pre-

laboratory activity (i.e. n=22) during the activity period are 81.8 per cent (i.e. n=18), 63.6 per cent (i.e. n=14), 50 per cent (i.e. n=11), and 36.4 per cent (i.e. n=8). The respective figures for those who had submitted after the period (i.e. n=28) are 53.6 per cent (i.e. n=15), 32.1 per cent (i.e. n=9), 25 per cent (i.e. n=7), and 86.4 per cent (i.e. n=19).

Table 1 shows how learners who had submitted a lesser number of pre-laboratory activities (i.e. n=23) and those who have made no submissions (n=13), had faired; the shaded regions depict success.

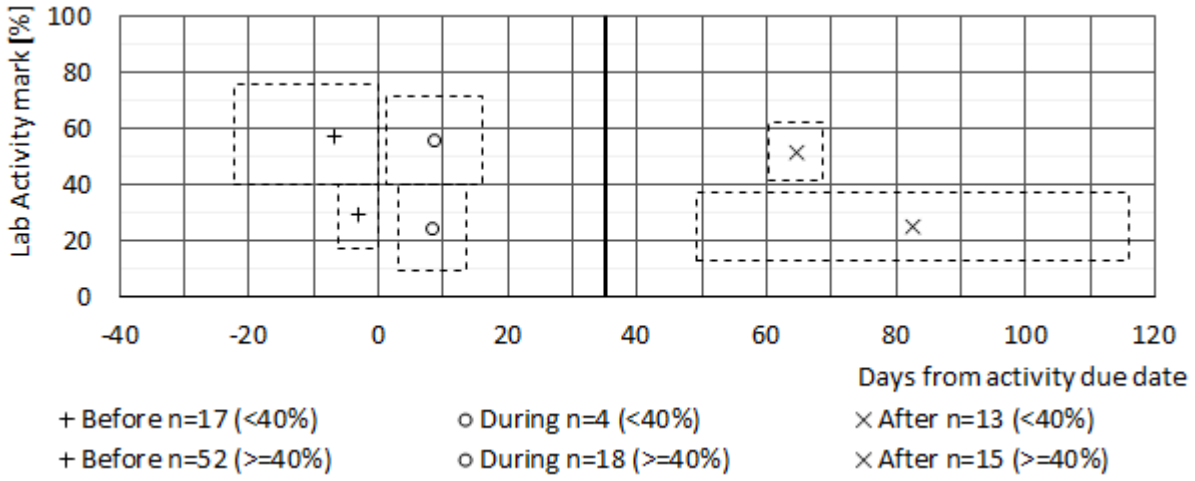


*Figure 2***.** Laboratory Activity Marks versus Pre-lab submission dates for 7-8 submissions.

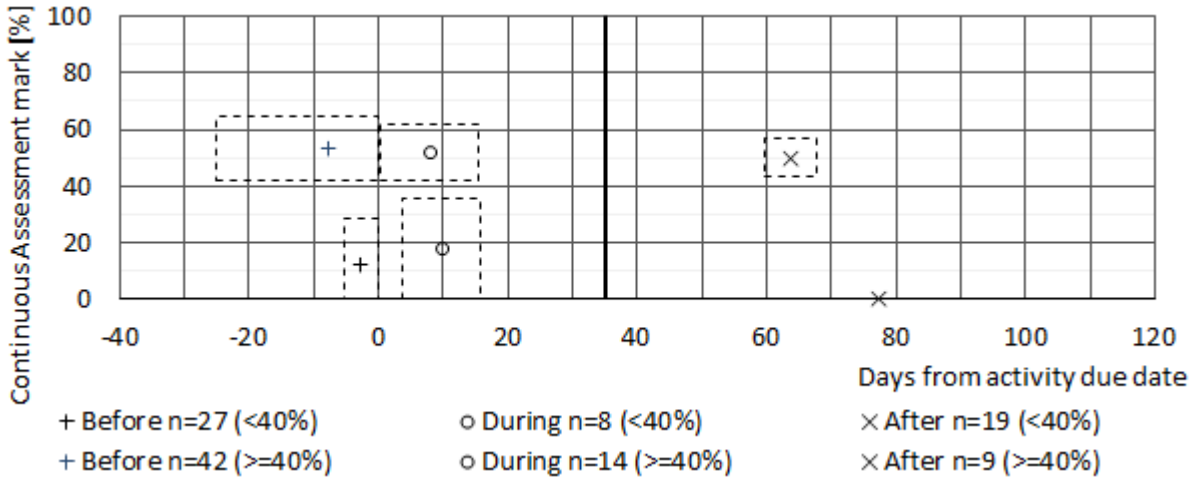


*Figure 3***.** CA Marks versus Pre-lab submission dates for 7-8 submissions.

Discussion and Conclusions

The results conclude that the effectiveness of completing the pre-laboratory activity on time has a positive influence on the overall success of students completing the course. The group-based peer-Socratic questioning may have influenced learners who have not completed 7-8 pre-laboratory submissions to show success during the three stages of assessments. A significant fraction of learners completing 7-8 pre-laboratory assignments (i.e. 45.4 per cent) has opted not to sit the Final Examination. This perhaps is due to lack of preparedness and/or hoping to better their final grade.

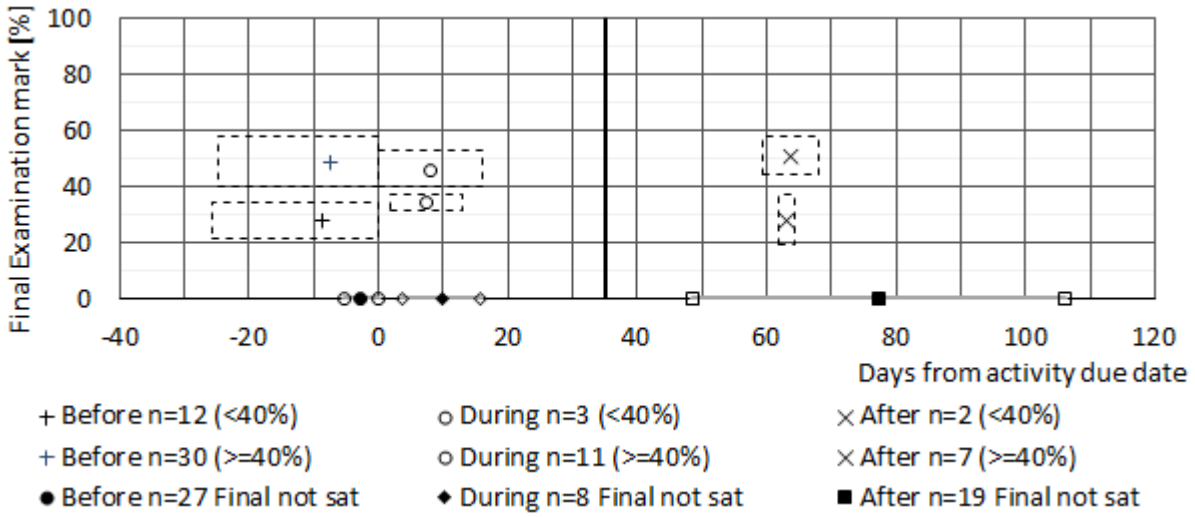


*Figure 4***.** Final Examination Marks versus Pre-lab submission dates for 7-8 submissions.

Table 1**.** *Performance of learners (i.e. n=36) submitting a lesser number of pre-lab activities*

Submissions	Lab Mark < 40 per cent			Lab Mark ≥ 40 per cent			CA Mark < 40 per cent			CA Mark ≥ 40 per cent			Final Mark < 40 per cent			Final Mark ≥ 40 per cent			Final not sat		
	Before	During	After	Before	During	After	Before	During	After	Before	During	After	Before	During	After	Before	During	After	Before	During	After
4-6	3	2	1	7	1	1	5	3	1	5	0	1	2	0	0	3	0	1	5	3	1
1-3	0	4	0	0	4	0	0	5	0	0	3	0	0	0	0	0	3	0	0	5	0
0	5			8			6			7			1			6			6		

References

Black, P., & William, D. (1998). *Inside the black box: Raising standards through classroom assessment*, © Phi Delta Kappa International. Retrieved on July 7, 2019, from https://pdfs.semanticscholar.org/15bc/cadd19dbeb64ee5f0edac90e5857e6d5ad66.pdf.

Paul, R., & Elder, L. (2008) Critical Thinking: The Art of Socratic Questioning, Part III, *Journal of Developmental Education*, 31(3), 34-35.

Students' perceptions on educational service quality; Case study at University of Vocational Technology, Sri Lanka

M. Thenabadu
University of Vocational Technology
mal.thenabadu@gmail.com
H.A. Senevirathne
University of Vocational Technology
helawikum@gmail.com

Abstract

One of the key challenges faced by the University of Vocational Technology is to attract and retain students and manage educational service quality. Current student dropout rate observed in the University is around 35% which is an alarming concern to the University, which may be due to a lapse in service quality. This study explored the service quality as per the SERVQUAL Model which measures service quality using five distinct dimensions; Tangibles, Reliability, Responsiveness, Assurance, and Empathy on first-year students of Bachelor of Technology in Food Process Technology degree course. The objective of this study is to identify gaps that exist in quality dimensions as per their expectations and perceptions. The adapted version of the SERVQUAL questionnaire (Parasuraman, Berry, & Zeithaml, 1990) was used in the study, where students responded to a series of questions based on five key dimensions. Five hypotheses were evaluated to find if a gap exists between expectations and perceptions, statistically analysed using the paired t-test.

The results showed a significant difference between students' expectations and perceptions in all quality dimensions assessed. The resulting gap score is negative, which shows that expectations are higher than the perceived service quality. The least gap score is observed in the "tangibles" dimension and the highest gap score is observed in "empathy" dimension. A significant difference is observed between student expectations and perceptions in all five dimensions. The highest gap score is observed in "empathy" dimension. The study concluded that the level of educational service quality perceived by undergraduates of the Food Process Technology Degree course is not up to their satisfaction. Hence, it is suggested that the Institution takes necessary measures to improve the deficient aspects of the educational service quality.

Purpose

Attracting new customers and retaining existing customers is the main focus of business organisations. The quality of product delivery has been long studied in the discipline of business management (Gronroos, 1992). However recently it was identified that quality of service delivery is also a critical factor in determining the success of any business (Parasuraman, Zeithaml, & Berry, 1985). Parasuraman, Zeithaml and Berry (1988) described service quality as the ability of an organisation to meet or exceed customer expectations. Parasuraman et al. (1990) developed a multiple-attribute model called SERVQUAL to measure service quality. This model measures service quality using five distinct dimensions that can be considered as indicators of the perceived service quality. These five dimensions are Tangibles, Reliability, Responsiveness, Assurance, and Empathy. Service quality of higher education

delivered by universities plays an important role in attracting and retaining students. Assessing educational service quality has not been given importance in the university sector.

The objectives of this research are to identify the expectations and perceptions of students who participate in the Food Process Technology degree course and to study educational service quality gaps using the SERVQUAL model.

Methodology

The SERVQUAL questionnaire has two sections: one to map customer expectations in relation to a service segment and the other to map perception in relation to a certain service company (Fen & Meillian, 2005). The original SERVQUAL scale used 22 questions to measure the five dimensions of service quality and in this instance, it was adapted to suit the characteristics of a higher educational institute. The adapted model was then pilot tested to identify possible problems and opportunities for improvement.

The questionnaire was administered to 45 first-year students of the degree programme; first the expectations version and then the perceptions version. After applying the questionnaires, the data were tabulated and interpreted. The Gap Score identified as Perception (P) – Expectation (E), was calculated for each statement. The average Gap Score for each dimension of service quality was obtained by considering the gap scores for each of the statements that constitute the dimension and dividing the sum by the number of statements making up the dimension. These scores for each dimension was then summed; then divided by 5 to obtain the average SERVQUAL Score. This is an un-weighted measure of service quality for the dimensions being measured. The calculated mean value of the expectations and perceptions of each dimension was compared using the paired t-test method to determine the service gap. The values for all five dimensions were computed considering a 95% confidence interval.

Results

Both expectations and perceptions were measured using a 7-point hedonic scale (i.e. 1-strongly disagree to 7-strongly agree) to rate their level of agreement or disagreement. The numbers at the two ends of the scale showed a high level of expectations or perceptions. Perceptions were based on the actual service they received in the course while expectations were based on past experiences and information received about such courses. The quality score measures the service gap or the degree to which expectations exceeded perceptions. The more positive the P-E scores, the higher the level of service quality, which led to greater customer satisfaction. Satisfaction and service quality are both treated together as functions of customer perceptions and expectations. In most cases, when expectation and perception are equal, service quality is satisfactory.

The Tangibles dimension includes the aspects: availability of modern-looking equipment, tools, and other teaching aids, visually appealing physical facilities such as classrooms, practical workshops, neatly dressed teachers and staff, visually appealing materials associated with the training (i.e. handouts, handbooks, leaflets).

Table 1 gives the mean gap score (P-E) as -1.23 for the Tangibles dimension. The negative gap score reveals that the students do not think that the "Tangibles" fulfill their expectations. The computed t-statistic was t = 10.13 and p =0 .00. Therefore, it can be concluded that there is

a significant difference between student expectations and perceptions in the tangibles dimension.

Table 1**.** *Paired sample statistics for Mean Tangibles Dimensions*

Pair 1 statistics	Mean	N	Std. Deviation	Std. Error Mean
Expectation (E)	6.57	45	.44	.06
Perception (P)	5.34	45	.61	.09
Gap Score (P-E)	-1.23			

The Reliability dimension includes the following aspects: keep promises, show a sincere interest in solving problems of students, give proper service the first time, provide the service at the time the Institute promise to do so, and maintain error-free records. Reliability is connected to the consistency of performance and dependability (Grönroos, 1992). The mean gap score (P-E) (refer to Table 2) is -2.25. The computed t statistic was t = 21.81, and p =0 .00. Hence it can be concluded that there is a significant difference between student expectations and perceptions in terms of the Reliability dimension.

Table 2**.** *Paired sample statistics for Mean Reliability Dimensions*

Pair 1 statistics	Mean	N	Std. Deviation	Std. Error Mean
Expectation (E)	6.64	45	.47	.07
Perception (P)	4.39	45	.46	.07
Gap Score (P-E)	-2.25			

The Assurance dimension includes aspects such as knowledge to be transmitted by the teacher and the ability to learn beforehand, give prompt service to students when it is required, teachers and other staff always be willing to help students, and staff never too busy to respond to students' requests. According to Grönroos (1983), this factor considers the extent to which the teachers and the administrative staff are willing to provide prompt service. This dimension can be connected to technical quality because the features are about how the service is delivered. The mean gap score (P-E) (refer to Table 3) is -2.14. The computed t statistic was t = 17.46, and p =0 .00. A significant difference between student expectations and perceptions in terms of the Assurance dimension is observed.

Table 3**.** *Paired sample statistics for Mean Assurance Dimension*

Pair 1 statistics	Mean	N	Std. Deviation	Std. Error Mean
Expectation (E)	6.52	45	.46	.07
Perception (P)	4.38	45	.60	.09
Gap Score (P-E)	-2.14			

Responsiveness dimension include the aspects such as teachers and staff instill confidence in students, students feel safe in their financial transactions, teachers and other staff are consistently courteous with students, teachers will have the knowledge to answer students' questions. The mean gap score (P-E) (refer to Table 4) is -1.94. The computed t statistic t =

16.24, and p =0 .00. Results show a significant difference between student expectations and perceptions.

Table 4**.** *Paired sample statistics for Mean Responsiveness Dimension*

Pair 1 statistics	Mean	N	Std. Deviation	Std. Error Mean
Expectation (E)	6.50	45	.46	.07
Perception (P)	4.55	45	.60	.09
Gap Score (P-E)	-1.94			

The Empathy dimension includes the following aspects: teachers give individual attention to students, flexible learning hours convenient to all their students, give personal service /attention, students have the Institute's best interest at heart, understand the specific needs of the student. The mean gap score (P-E) (refer to Table 5) is -3.14. The computed t statistic t = 45.67, and p =0 .00. The results show that there is a significant difference between student expectations and perceptions.

Table 5**.** *Paired sample statistics for Mean Empathy Dimensions*

Pair 1 statistics	Mean	N	Std. Deviation	Std. Error Mean
Expectation (E)	6.52	45	.35	.05
Perception (P)	3.38	45	.31	.05
Gap Score (P-E)	-3.14			

Discussion and Conclusions

For all dimensions, the perceived score is less than the expectation score. The resulting gap score has negative values which indicate that the expectations are higher than the perceived educational service quality. Students have the highest expectations on the Reliability dimension, followed by the Tangibles, the Assurances, the empathy, and the responsiveness dimension.

According to Parasurman et al. (1990) reliability is an important dimension and that is to some extent confirmed by this study. Reliability is the most important dimension according to the result of this study. When it comes to perceptions the tangibles dimension yields the highest score, followed by responsiveness, reliability, assurance, and empathy.

The least gap score is obtained for the tangibles dimension. According to this observation, Tangibles are not given greater importance with regard to expectations, however, it is the dimension that received the highest perceived service quality. The Highest gap score is observed in the empathy dimension, where students feel that the educational service they receive is not satisfactory.

The gap scores for reliability and assurance received high negative scores, while the score for responsiveness is somewhat smaller. According to statistical analysis, there is strong evidence to support the claim that a significant difference exists between student expectations and perceptions in all five dimensions. The empathy dimension had received the greatest quality

gap indicating that the services lack this dimension very much. The tangibles dimension has the lowest gap score.

References:

Fen, Y. S., & Meillian, K. (2005). Service quality and customer satisfaction: Antecedents of customer's re-patronage, *Sunway Academic Journal*, 4, 60-73.

Grönroos, C. (1992). Service Management: A Management Focus for Service Competition. In C. H. Lovelock (Ed.), *Managing Services: Marketing, Operations, and Human Resources*, Englewood Cliffs, NJ: Prentice-Hall.

Grönroos, C. (2000). *Service management and marketing: a customer relationship management approach* (2nd Ed.). Chichester, UK: John Wiley & Sons.

Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 49(4), 41-50.

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12-40.

Parasuraman, A., Berry, L. L., & Zeithaml, V. A. (1990). *An Empirical Examination of Relationships in an Extended Service Quality Model.* Marketing Science Institute, Cambridge, MA.

Empathy as a Tool to Develop Learner Engagement in a Mixed ability ESL Classroom: Student Perceptions

A.D.I. Anushika
Department of Transport and Logistics Management, University of Moratuwa.
ishani.anushika23@gmail.com

Abstract

The present study was conducted in a mixed-proficiency English as a Second Language (ESL) classroom of 60 students in a well-known state university in Sri Lanka. It was observed that, in this classroom, in general, the engagement of learners is unsatisfactory. A writing activity conducted in the classroom on students' self-limiting beliefs about learning English disclosed that the affective filter of the less proficient learners is high when they are learning with the advanced learners in English. On the other hand, the advanced learners wished the content of the class to be more challenging and appeared to be bored when working with less proficient peers. The present qualitative study draws from Bourdieu's (1986) concepts of cultural, social and linguistic capital and assumed that students getting to know about each other well and developing empathy among learners would solve this issue. The study employed energisers and students' narratives of learning English in examining this assumption. The feedback collected later revealed that these activities had made the learners understand how the capital learners bring into the class, results in differences in their English language proficiency. It also further disclosed that the majority of advanced learners were willing to volunteer to help their less proficient peers in improving their English and making them more comfortable in the classroom. The study employed an action research method and used observations, reflections, and interviews as data collection tools. The present study encourages teachers to be conscious of unequal relations among students and to be creative in addressing those.

Background

The improved learner engagement in a class is the ultimate expectation of an educator with the belief that more inquisitive and motivated the learner is the more he learns. According to the Glossary of Education Reform (2016, para.1), "learner engagement refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education". The learner engagement further echoes a learner's interaction and cooperation with co-learners and instructors. However, it was observed that, in mixed ability ESL classroom settings, in general, the engagement of learners is unsatisfactory. Even though any class can be literally called as of mixed ability as its individual learners differ from each other in terms of knowledge and ability, the term 'mixed ability' is specifically used in English Language Teaching for a group of students whose individual differences are significant especially in terms of their language level (Erol, 2008). Hence, a mixed ability ESL classroom is usually made up of students who range from beginners to advanced learners of English. There can be many reasons as to why a learner does not engage actively in classroom activities. For example, Krashen (1981) in his theory on high affective filter tries to explain how emotional variables can hinder a lack of engagement in the classroom thus preventing the learners from acquiring a second language. He elaborates that when the affective filter is

high, individuals may experience stress, anxiety, and lack of self-confidence that may inhibit success in acquiring a second language. However, examining learner engagement in a mixed ability ESL class can be quite complex owing to its heterogeneity.

An activity conducted in the target classroom on self-limiting beliefs of students in learning English disclosed that most of the less proficient students feel uncomfortable studying with their more able peers. They had used terms like 'afraid', 'reluctant', 'hesitant', 'lacks confidence', 'cannot speak', 'do not understand', 'difficult', 'shy', "not skillful", 'struggle', 'do not have skills', 'not good at', 'shiver', 'stammer' in describing how they feel in the language classroom. It should be noted that most of these insecure expressions are relative and comparative. This is further confirmed by them mentioning that they were afraid of being judged and laughed at by their more able peers. On the other hand, the engagement of advanced learners of English in a mixed ability class can also be unsatisfactory despite their high proficiency level. The advanced learners usually consider being in a mixed ability class as a waste of their time and wish the content to be more challenging. As a result, they often appeared to be bored, not interested and sometimes even prevent themselves from actively engaging in classroom activities. The below-mentioned feedback was given by an advanced learner of English in a mixed ability ESL class: 'It would be better if the focused students and the rest are segregated. May be not possible. But it does not feel nice to be idling or engaging in our own work when the lecturer is present but is focused on other students.'

The feedback shows that the advanced learner assumes that the particular course is designed for the less proficient students as she calls them as the focused students. She further suggests segregating the less proficient learners from the advanced learners, so that the advanced learners will not have to idle until their less proficient peers finish the task given by the teacher. This very feedback suggests that even though advanced learners are more capable of using the language they feel that they are given less attention in a mixed ability class as more focus is given to the less able. In a context where both less proficient and advanced learners are uneasy about having each other, it also should be noted that conducting pair work or group work which highly contributes to learner engagement can also be quite challenging. These comments from students were insightful in understanding the prevailing gap between the advanced learners and less proficient learners. It also was understood that these learners should be encouraged to appreciate, acknowledge the presence of each other and learn to positively depend on one another. In achieving this goal, the present study assumes that empathy which can be introduced as "a sharing of emotional states with a target" (e.g. Hoffman, 1984) can be used to bridge the gap between these two parties which will finally lead to an engaging classroom.

Method

The present study was conducted in a first year, second semester, mixed ability ESL classroom of 60 students in a well-known state university in Sri Lanka. The study employed an action research method and used observations, class discussions as data collection tools. First, the study employed energisers to make students comfortable with one another. Energisers refer to activities which are fun and mostly physical that force the students to depend on each other to achieve a particular outcome. They also could be tasks that reinforce rapport between the students and give a sense of "all being in it together". These energisers were used in every other lecture throughout the semester. Most importantly the main focus of

such energisers was not the use of the target language but building trust among one another. Secondly, the present study employed student exchanging personal narratives of learning English in order to develop empathy among students. Keen (2006) asserts that "empathy, a vicarious, spontaneous sharing of affect, can be provoked by witnessing another's emotional state, by hearing about another's condition, or even by reading" (p.208). Furthermore, there is considerable literature on using student narratives to encourage empathy. (Keen, 2006; Stansfield & Bunce, 2014; Stepien & Baernstein, 2006) Therefore, it was assumed that exchanging personal narratives would be more effective in encouraging empathy as they readily evoke feeling responsiveness. As the first step of sharing narratives, the teacher herself shared her own journey of learning English with the students, describing the opportunities, obstacles she had learning English as a child and as an undergraduate. Then the students were asked to write their own stories of learning English in any language they are comfortable in and were requested to keep their stories anonymous. Then the stories were collected, and students were grouped in five and each group was given a set of stories to read. Once they finished reading, the groups were asked to exchange the stories. This was then followed by an open-class discussion about what they had learnt about each other.

Results and Discussion

The activity on sharing narratives led to a kind of 'mental restructuring' of students. In their narratives, especially the less proficient students disclosed that they lacked opportunities and resources to learn English. In his narrative, a Tamil student from the Northern Province had described how war prevented him from learning English. He had described how he and his family had to hide in the jungle to save their lives and how he could not attend school for two consecutive years. He had further explained that what it felt like studying in the university where English is the medium of instruction. He had further shared his insecure feelings when he had to work with advanced learners of English. Thus, the students' personal narratives brought what was dormant, embodied and therefore caused subconscious suffering, to surface conscious thinking. They shared their mental trauma, anxiety, and shame that they experienced or anticipated, not being so-called 'English-speaking' elites.

These stories were influential in changing perceptions of advanced learners towards their less proficient peers. A discussion was held after the session on student narratives. It also further disclosed that the majority of advanced learners were willing to volunteer to help their less proficient peers in improving their English and making them more comfortable in the classroom. After the session, a student met me in person and offered her help in the grammar class that I am conducting for her less proficient peers. She also made this an opportunity to describe how she already helps her less proficient Tamil friends at the hostel with English grammar. After this activity, it was observed that the advanced learners started to acknowledge the presence of the less proficient peers and started to praise their peers more often. It was also observed that students started to prefer pair and group work over working individually. Close examination of these group activities shed light on how the session on personal narratives had promoted open-mindedness, attunement to others and non-judgmental interactions. Later in the semester, students were asked to write a reflective note on looking back at the session on sharing stories.

"The session on narrating the story of learning English was very effective, and it left a heavy feeling in my heart. Even if I can handle the language, there are some who cannot deal with

English well. This session made me understand why they are not on the same level as I am. I understood that each and everyone has their own reasons and stories behind their knowledge in English. After that, I tried helping my friends who were not confident in English. I felt that it was a responsibility of me as a colleague".

This reflection suggests the growing responsibility the advanced learners felt for their low performing friends. This suggests that these activities had made the learners understand that each student represents a microcosm of society. She has understood Bourdieu's (1986) concept of inequality of capital on her own. In other words, the student has understood that unequal access to opportunities results in inequality in the level of knowledge in a particular language. Overall, the present study suggests that empathy strengthens the classroom as a community.

On the other hand, the feedback from the students suggests how the activity has helped them to feel more emotionally secure. Tomlinson (2001) suggests that a class should be both physically and emotionally safe for a student. He further explains that "emotional safety happens when you feel that people accepted who you are and valued enough" (p.22). A less proficient student in his reflection has described how positively this particular activity has changed the classroom environment. He has mentioned that now he feels that he too belongs to the class and he appreciates the help he is receiving from his peers. The present study recommends teachers to be conscious of unequal relations among students in mixed ability classes and to be creative in addressing those.

References

Bourdieu, P. (1986). The forms of capital. In J. Richardson (Ed.), *Handbook of Theory and Research for the Sociology of Education* (pp. 241-258). Westport, CT: Greenwood.

Erol, A. (2008). *Teaching to mixed ability classes and various applications used in 6th grade elementary school EFL students* (Doctoral dissertation, Selçuk Üniversitesi Sosyal Bilimler Enstitüsü).

Glossary of Education Reform (2016). Learner Engagement. Retrieved on June 26, 2019, from https://www.ewa.org/glossary-education-reform.

Hoffman, M. L. (1984). Interaction of affect and cognition in empathy. In Z.E. Izard, J. Kagan & R. B. Zajonc (Eds.) *Emotions, Cognition, and Behavior*, 103-131, Cambridge, MA: Cambridge University Press.

Keen, S. (2006). A Theory of Narrative Empathy. *Narrative*, 14(3), 207-236. DOI: 10.1353/nar. 2006.0015.

Krashen, S. (1981). Bilingual education and second language acquisition theory. In Schooling and Language Minority Students: A Theoretical Framework, Office of Bilingual Bicultural Education, State of California. Los Angeles: Evaluation, Dissemination, and Assessment Center, California State University, 51-79.

Stansfield, J., & Bunce, L. (2014). The Relationship Between Empathy and Reading Fiction: Separate Roles for Cognitive and Affective Components. *Journal of European Psychology Students*, 5(3), 9-18. DOI: http://dx.doi. org/10.5334/jeps.ca.

Stepien, K. A., & Baernstein, A. (2006). Educating for empathy. *Journal of general internal medicine*, 21(5), 524-530.

Tomlinson, C. A. (2001). *How to differentiate instruction in mixed-ability classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development.