



Costing of a Blended Course at the Open University of Sri Lanka: An Empirical Study

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Abstract

In a viable Open and Distance Learning system, providing immediate access to learning resources and fostering effective teacher-learner interactions are essential components while balancing the cost of the course without compromising quality. Owing to the advancement of ICT across the globe, the Open University of Sri Lanka has initiated integrating online components into the existing print-based courses and offering them as blended courses. The gauging costs for these blended courses are also vital to determine the various costs components. Hence, an empirical study was conducted to estimate total costs and cost per student of a blended course. In this empirical study, costing was carried out, based on five major costs categories; course materials design and development, course materials production, course delivery, student evaluation, overhead and infrastructure.

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The 'Drama and Poetry' course in the Diploma in English study programme was selected to identify cost components in a blended course. The results indicate that total costs of this course increases with the introduction of the online component; online tutoring was identified as the most expensive component of this blended course. The production costs of the online component have not increased with increasing student enrollment as in print-based component. The outcome of this study highlights that the costs of design and development of course materials are lower compared to delivery of course where online instructions are carried by the teacher in addition to the face to face instructions. Therefore, academic members need to pay attention to Instructional design of the course and need to prioritize the most crucial elements that foster learning and allocate online tutoring only for developing higher order skills.

Keywords: blended learning; costing; online learning; OUSL; unit cost

1. Introduction

In a viable Open and Distance Learning (ODL) system providing immediate access to learning resources and fostering effective teacher-learner interactions are essential components while balancing the cost of the course without compromising quality. The advancement of information and communication technology (ICT) across the globe has made a pathway for online learning by providing a 'digital corridor' connecting all the citizens in the world enabling 'immediate access to learning resources' and 'increasing teacher-learner interactions'. According to Oakley[1] cited in Curran [2:27] online learning is 'a learning process in which learners can communicate with their instructors and their peers, and access learning materials over the Internet or other computer networks'.

Over the period, administrators and online teachers felt that effectiveness of online teaching was questionable as it was a time consuming process. When compared to early delivery mode in DE, administrators and teachers had to spend a considerable time for delivering online instructions even after working hours. This caused to increase the costs of delivery in online teaching. On the other hand there is a gradual reduction of funds for state owned higher education institutions and they are being strongly encouraged to generate funds by offering demand driven courses. Thus, it is a great challenge to higher education institutions to become forward-focused and to remain competitive in this rapidly changing world [3]. Gradually, many authors realized that fully online learning had failed to fulfill its promises to replace the time-consuming and high-cost, conventional teacher-led training[4, 2, 5, 6, 7, 8, 9, 10].Therefore, blended learning ,which blends components obtained from both online teaching and face-to-face teaching with printed course material has been commenced .The advantages of blended learning are its "simplicity of taking the best from both online and face to face instructional designs" [5:19].

However, developing and delivering online component of a course is not an easy task. On the one hand learners expect and demand anytime/anywhere access to courses. On the other hand, higher education institutions have to generate funds by offering demand driven courses as there is a gradual reduction of Government funds. As a result, determining the costs of a blended course has become critically important for ODL institutions to make judgments at the strategic planning and budgeting levels and to forecast its future developments. Therefore

efficient cost estimation mechanism through a cost model is essential to provide accurate information on costing for both educators and decision makers of the institution to take right decisions at the right time. Therefore, this paper reports on the empirical findings of the associated costs of a blended course at the OUSL.

2. OUSL Context

The Open University of Sri Lanka is an academically independent national university in Sri Lanka. OUSL delivers higher education through distance learning system. A person who is over the age of 18 years could follow study programmes at OUSL leading to Certificate, Diploma, First Degree, Post Graduate Degree, or other academic qualification. The OUSL constituted under the Universities Act No. 16 of 1978 and the Open University of Sri Lanka Ordinance No. 16 of 1990 [12]. Therefore, it has the equal legal and academic position as other State-owned Universities in Sri Lanka. However, the OUSL is a fee levying University and consequently, students are required to pay fees to recover the expenses for their studies. The fee is charged from students annually to cover the expenses relevant to design and development of course materials, payment for visiting academics, examiners hired and for conducting Continuing Assessment Test, Final examinations etc. The course fee charged by students is one third of the total expenditure and the balance two third of total expenditure is a grant by the Government of Sri Lanka through Universities Grants Commission (UGC). Due to the increases of expenditure relevant to courses, the fees charged from students are increased by 10 %. In this context it contrasts with other state owned universities in Sri Lanka which do not charge course fee from students, Most of academic departments are under pressure to generate adequate income to sustain the study programmes. OUSL needs to have a mechanism to assess expenses relevant to the entire courses conducted. This mechanism should have the ability to permit changes occurring in the system.

OUSL offers over 60 study programmes of academic, professional, vocational and in-service training programs with a wide range and more than nine hundred courses, leading to Certificate, Diploma, Bachelor's Degree, Post graduate Diploma, Master's and Doctoral Degrees [11]. Though the technological development places in ranges of tools available to the learner, yet print plays a significant role in delivering ODL courses. There are several key challenges faced by students, such as access to technology, social-cultural factors, and readiness to use technology. However, the OUSL has decided to offer courses through the blended approach, combining online learning, yet retaining print materials as the core medium of instruction. Thus, the OUSL started to integrate online components with print-based courses from 2003 [13].

Since then, online courses have been delivered using different learning management systems; "Manhattan" and "MOODLE" with increasing interactivity. A steady increase in the number of online courses was pronounced with the assistance of the Distance Education Modernization Project (DEMP- operated from 2003-2009) which was funded by the Asian Development Bank (ADB) under the Ministry of Higher Education [13]. The delivery of these online courses is through National Online Distance Education Services (NODES) via twenty NODES Access Centers, located mainly at the local (regional or study) centres of the OUSL around the country. Most of these online courses are supplementary in nature using print as the main medium with occasional face to face components. A few certificate courses on professional development are offered purely online. Several preliminary studies on costing have been carried out using different methodologies in the past 34 years of

history of the OUSL [14]. However, there was no extensive and systematic study on costing for blended and online courses.

3. Conceptual framework

The essence and appeal of blended learning is that it has the advantage of taking the best from both online and face to face instructional designs [5:19]. Hence, blended education models has become increasingly popular in a wide array of learning domains [17] and represents an eclectic blend of technologies and modalities enabling both synchronous and asynchronous teacher-learner and learner-learner interactions in a single course or a study programme via distributed education [18]. Canadian Council on learning [19] suggests that present e-learning efforts are expected to use an amalgamation of methods identified as blended learning.

A range of tools and methodologies have been used by researchers to study the economics of ODL systems [15, 21]. Many researchers have used the functional view of ODL system introduced by Rumble in [15] for identifying activities of an ODL system when assessing costs of an ODL institution. The open and distance education system includes, two major operating systems. They are materials subsystem and student subsystem [15]. Material subsystem includes design and development, production, distribution and reception of course materials. Student subsystem deals mainly with all the student related activities from student enrolment to organizing of graduation ceremonies and to provide transcripts and references after graduation. Logistical and regulatory subsystems support the major operating systems. Logistical subsystem deals with human and financial resources and infrastructure facilities while regulatory subsystem plans and manages the overall system relating to all the systems.

Having reviewed several research studies conducted on costing ODL system in [20, 23, 15, 21, 24, and 22], Abeyasinghe and his colleagues in [14] adapted a conceptual framework to identify cost drivers in different categories which contribute for total costs for a blended course. Figure 1 illustrates the proposed conceptual framework in detail.

3.1 Research Objectives

The objectives of this study were to identify:

- the cost structure of a blended course; print and online component as the main delivery medium,
- total costs of the blended course,
- cost per student for the blended course.

4. Methodology

The conventions in conceptual framework put forward by Abeyasinghe *and his colleagues* in [14] was used to identify relevant activities involved in the blended course and the way they contribute towards the total cost. The total cost for the blended learning course is formed by adding costs relevant to five broad categories based on the basic costing formula;

Total costs = Fixed costs + Variable costs

4.1 Selection of a blended course

The “Drama and Poetry” course (LSD1206) of the Diploma in English Programme was selected as it has been offered as a blended course for more than four years and teacher-students interactions were comparatively higher compared to other similar blended courses at the OUSL.

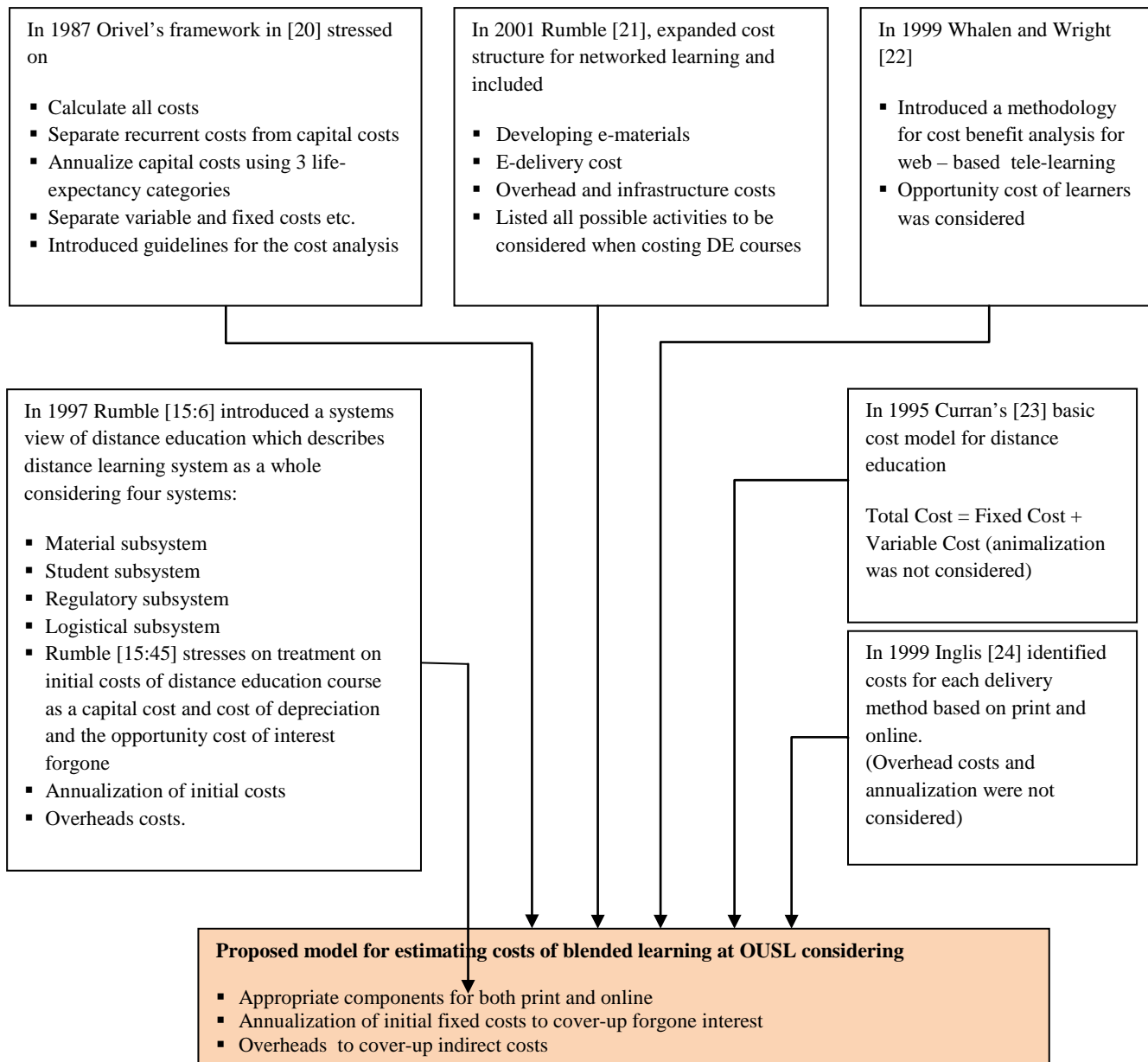


Figure 1: Conceptual framework for developing the costing model for a blended course at the OUSL [14]

4.2 Data collection

Interviews were used as the main method of gathering information from different key personnel. In addition, documents associated with procedures, mechanisms, approvals, circulars, paying vouchers, working sheets, etc. were used to collect other relevant information. The details of activities drive in costs for planning of the study programme and course development were gathered from interviewing relevant academic staff, academic coordinator of the Drama and Poetry course, teachers who were involved in conducting face to face and online sessions and academic support staff who maintain records related to activities and meetings. The production costs for print-based course materials were obtained from the OUSL Press where it has a proper costing system for the produced course materials. The details of activities, drive in costs of production related to the online course were collected from relevant teachers and multimedia/content developer of the online course. The data relevant to delivery of the course were gathered from academic and academic support staff of the department of language studies, head and the staff at the local centres with the help of documentary evidence. Data relevant to online delivery was gathered from IT division and MOODLE administrator of the OUSL. Further, the details of activities drive in costs relevant to students' evaluation were gathered by interviewing Senior Assistant Registrar /examination, Assistant Registrar/ Faculty of Humanities and Social Sciences and staff at the local centres of the OUSL. The details relevant to payments were obtained from interviewing bursar and relevant support staff in the finance division of the OUSL.

The conceptual framework put forward by Abeysinghe and his colleagues in [14] was used to identify cost drivers for the blended learning course into five broad categories;

- Costs of course materials design and development
- Costs of course production
- Costs of course delivery
- Costs of student evaluation
- Costs of overheads and infrastructure

The relevant costs drivers in each broad category were identified separately.

a. Course material design and development costs include

- common design and development costs associated with print and online,
- Specific costs related to online learning such as payment for multimedia developers, costs of multimedia equipment including software.

b. Course material production costs include

- production of course materials, audio, video, graphics and animations

c. Course delivery costs comprise

- distribution of print course materials
- costs relevant to contact sessions and
- costs associated with tutoring
- costs of online support, web server storage, Internet service provider (ISP) chargers

d. Student evaluation costs include Continues Assessments Tests (CATs) and final examination

e. Overheads and infrastructure costs incorporate

- payments for all categories of staff who are not directly involved with a particular course
- operational and maintenance costs for the networks
- Utility expenses of main campus and local centres, etc.

In 2013 Abeysinghe and his colleagues in [14] defined total costs for Blended Course as,

Total costs for Blended Course (TBC) = Total costs for print-based component (TP) + Total costs of online component (TO)

TP = Fixed costs for Print + Variable costs for Print

TP for one year = Annualized Fixed costs (Print) + Variable costs (Print–one year)

TO = Fixed costs (Online) + Variable costs (Online-one year)

TO for one year = Annualized Fixed costs (Online) + Variable costs (Online - one year)

The calculation of costs related to overhead apportionment and absorption has to consider the costs of all the OUSL courses along with the number of students in each course. This is a time consuming and tedious task since OUSL offers more than 600 courses. Therefore, this study relies on the UGC report [25] to estimate overhead and infrastructure. The costs for overhead were based on the percentage which is included in the UGC report [25].

According to the UGC report [25] overhead costs comprise average expenditure for general administration, maintenance and welfare which is 25% of recurrent expenditure Therefore, to calculate the total costs for this course, 25% of variable costs (relevant amount in row 2, 3, 4 in Table -1) were added.

5. Results and discussion

The costs were calculated under five broad categories. In this study calculation for print and online components with respect to broad categories were carried out separately and added to get the costs for a blended course as in table 1.

When calculating costs of course material design and development for a year, the calculated total costs was

annualized and treated as initial capital cost.

Table 1: Cost items in each broad category relevant to print and online components

No	Broad category	Item of expenditure	Print	Online	Blended course	
			component	component	Costs in	Costs in
			LKR	LKR	LKR	US \$
1	Course material design and development	Needs Survey costs(annualized)	17,247.84	3,449.57	20,697.41	179.98
		Curriculum development costs(annualized)	1,484.03	593.61	2,077.64	18.07
		Course content development(annualized)	14,302.90	5,058.00	19,360.90	168.36
2	Course material production	Reproduction according to the number enrolled (107 students)	119,340.31	25,350.00	144,690.31	1,258.18
3	Instructional Delivery/Student support	Visiting Academic payment, Non Academic involvements, premises charges for face-face session, web server expenditure	52,200.00	117,060.00	169,260.00	1,471.83
4	Student Assessments and Evaluation	Costs for 3 CATs and final examination	11,520.00	3,940.00	15,460.00	134.43
5	Overheads (25 % of addition of rows 2,3 and 4)	Administrative support, General Administration Utility chargers, LAN handling charges etc. (25 % of variable costs)	45765.08	36,587.50	82,352.58	716.11
Total costs			261,860.16	192,038.68	453,898.84	3,946.96
Costs per student-(for students enrolled =107)			2,447.30	1,794.75	4,242.05	36.89

The following standard formula for calculating the annualization factor based on Rumble in [15:45] was used for both depreciation and the opportunity costs of interest forgone.

$$a(r, n) = \frac{r(1+r)^n}{(1+r)^n - 1} \quad \text{..... Equation (1)}$$

Where $a(r, n)$ is the annualization factor, 'n' is the life of the capital investment, and 'r' is the prevailing rate of interest.

Generally, interest rate of a risk free investment is substitute for the value 'r'. In Sri Lanka, investing in Government Treasury Bills (12% in 2013) is regarded as the safest option for risk free investment. In this study, 0.5% was added to interest rate of Government Treasury Bills to consider for value 'r'.

Hence $r = 12.5$ and $n = 5$, (since Drama and Poetry course has been offered continuously for 5 years without any amendment) to the formula $a(r, n)$ in equation (1) resulted in $a(r, n) = 0.281$.

Subsequently, the initial fixed costs with respect to course design and development, both print and online component were multiplied with 0.281 to obtain the annualized value for one year period. However, without applying the equation -1, the appropriate values for $a(r, n)$ with different 'r' and 'n' could be obtained as revealed in Table 2.

Table 2: Different values for annualisation factor $a(r, n)$ which is used to get annual fixed cost for different period of depreciation and interest rates (adapted from Rumble [15:4]).

Life time of assets in years (n)	Interest Rates (r)					
	0.00%	5.00%	7.50%	10.00%	12.50%	15.00%
1	1.000	1.050	1.075	1.100	1.125	1.150
2	0.500	0.538	0.557	0.576	0.596	0.615
3	0.333	0.367	0.385	0.402	0.420	0.438
4	0.250	0.282	0.299	0.315	0.333	0.350
5	0.200	0.231	0.247	0.264	0.281	0.298
6	0.167	0.197	0.213	0.230	0.247	0.264
7	0.143	0.173	0.189	0.205	0.223	0.240
8	0.125	0.155	0.171	0.187	0.205	0.223
9	0.111	0.141	0.157	0.174	0.191	0.210
10	0.100	0.130	0.146	0.163	0.181	0.199
15	0.067	0.096	0.113	0.131	0.151	0.171
20	0.050	0.080	0.098	0.117	0.138	0.160
25	0.040	0.071	0.090	0.110	0.132	0.155
30	0.033	0.065	0.085	0.106	0.129	0.152

Figures 2 and 3 show broad cost categories for print and online components. The course material production cost was the highest in print component (45 %) and delivery component was the highest in online component (61%) whereas course design component was comparatively higher in the print component than the online component (print – 13%, online – 5%). This is because of that there are common components which are used in both print and online.

All the values are in local currency Sri Lankan Rupees (LKR) and US \$ conversion is given in the last column. These values are based on the Sri Lankan Rupee value in year 2011.

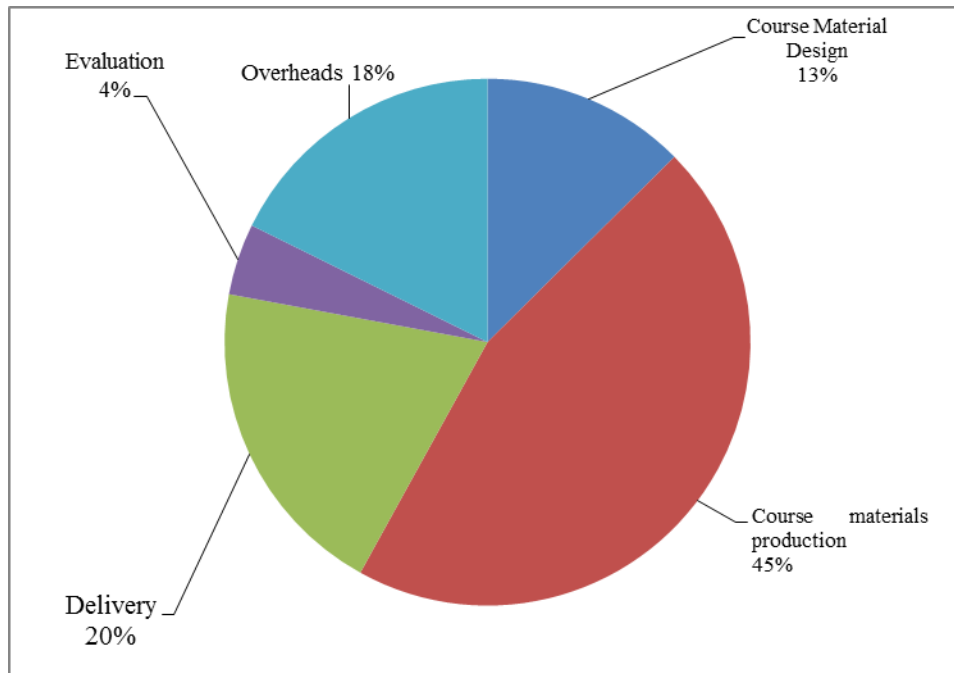


Figure 2: percentages of costs of categories for the print component of the blended course

The costs for print component and online component are LKR 261,860.16 (US \$ 2,277.04) and LKR 19,203.68(US \$ 1,669.90) respectively for 107 students.

Therefore, total cost for the blended course was LKR 453,898.84 (US \$ 3946.96) for 107 students in 2011/2012 academic year. Therefore, cost per student was LKR 4,242.05 (US \$ 36.89). Cost per student (unit cost) for print component was LKR 2447.30 (US\$21.28) whereas for online component was LKR 1,794.75 (US \$ 15.61).

The findings of the current study indicated that costs incurred for blended learning was higher compared to print-based courses due to the higher costs involved in online delivery via individualized online interactions. This abides the view expressed by Inglis in [24] where he argued that shifting from print-based to online delivery is not a cost saving mechanism. However, an argument can be made that blended learning provides more benefits to students by reducing opportunity and travel costs. In addition, students have more learning opportunities for individualized tutoring and their active engagement throughout the learning process may result

in a meaningful and rewarding learning experience. A study on an online blended course carried out by Liyanage in [26] clearly showed that online blended courses helped to raise the pass rate of continuing assessment test notably from 60 % in 2008 and 75 % in 2009. This leads to further research correlating student performance with course delivery.

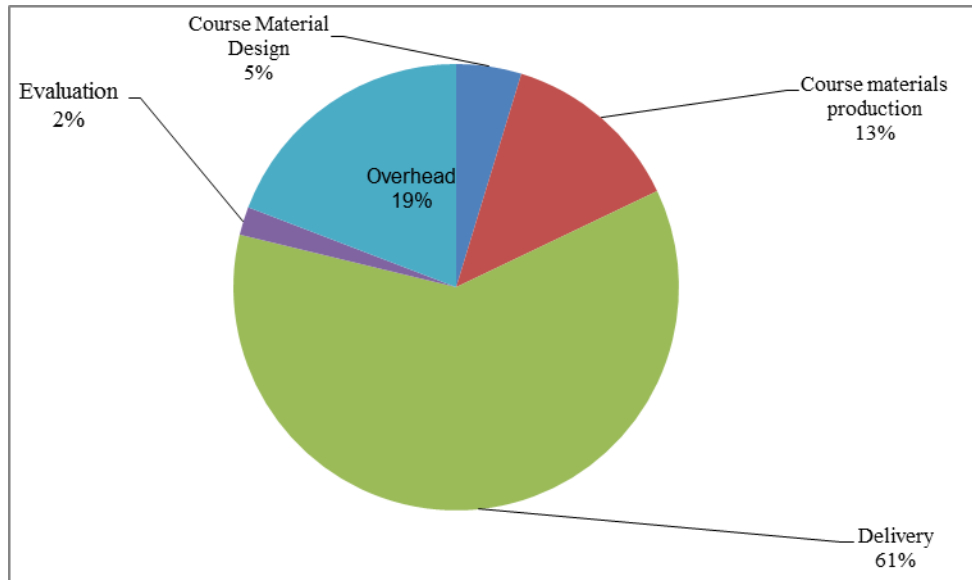


Figure 3: percentages of costs of categories for the online component of the blended course

The outcome of this research study also highlights the importance of instructional design in minimizing costs without compromising quality of the courses. The academic staff needs to prioritize the most crucial elements that foster learning and select the appropriate media considering student numbers and the nature of the discipline. Since online delivery is the most expensive item, the inclusion of online tutoring needs careful planning; which could be at the stage of facilitating the development of higher order skills of students.

6. The issues arising during the empirical study

The reliability and validity of costing of any product or services strongly depends on the availability of accurate data. It was observed during this empirical study that data relevant to most of the meetings of planning / designing /development of the study programme with different stakeholders were not properly recorded and maintained. Therefore, most of the data were taken from interviewing relevant staff members. Thus, the accuracy of these data is a source of concern. In addition, primary sources of evidence were not available for verification in certain stages. Unlike the other direct expenditure these costs were intangible.

The OUSL has a very comprehensive Management Information System (OMIS) linking all the local centres. However, retrieval of some recorded data in OMIS relevant to expenditure of courses was not accessible. This is because due to no opportunity to input essential key data such as course code etc. Therefore, cost data relevant to recurrent expenditure had to be obtained manually. Non-availability of data relevant to costs is common to

Sri Lanka as well as most of the countries. In 2005 Lindell in [27] stressed the difficulty in obtaining data on costs of distance education study programmes as some were reluctant to reveal the exact cost data. Further, Lindell in [27] reported that many researchers discussed the findings of costing at professional meetings and conferences but only a very few published as part of conference proceedings. This may possibly be the reason for the scarcity of costing research.

6.1 Constraints and limitation

In this study indirect costs of the blended course were considered as 25 % of total expenditure for course material production, course delivery and student evaluation. Gathering data related to all other courses offered by OUSL and expenditure of servicers department of the OUSL was a tedious and time consuming task. Therefore, indirect costs were calculated percentage of direct costs. Further, costs data fully depends on the context. Therefore, generalization of results of the present study is not correct for a different context which is a major limitation of this study. However, the research methodology followed in this study can be applied for different contexts with appropriate changes.

7. Conclusions and recommendations

Blended learning has become the most outstanding pedagogical innovation, a new habit to mix any kind of teaching and learning methods according to a suitable ratio. The goal of blended learning is to use technology as a tool for learning and to provide a discovery-based approach to online learning. It also provides the most efficient and effective instructional experience by combining different delivery modalities.

Blended learning helps the students to become 'anytime', 'anywhere' life-long learners. Blended learning provides more flexible, interactive, efficient, accessible and productive and varied learning experiences for both the teachers and the students. A blended learning technique provides teachers to deliver the lecture as well as assess student learning, using creative and innovative methods. Although online learning has become well established in many higher educational institutions, still many institutions are struggling to conceptualize and implement the technology of blended learning in their settings.

Findings indicated that the overall total costs of the course increased with the introduction of the online component; that is 28% increase in course design and development, 21% increase in course material production and 124 % increase in course delivery indicating online tutoring as the most costly component of this blended course. Therefore, prioritizing of the most crucial elements of leaning is very decisive and adjusts the ratio of print, face to face and online components according to the relevant discipline considering the enrolled student number.

Since maintaining records related to costing is very important to predict the cost estimates, it is recommended to establish cost centres at each key department of any organization, with a dedicated staff who can maintain a pool of proper cost data so that predictions/estimates for programmes / courses could be carried out effectively and efficiently.

Globalization has impacted on every sector in day to day life; it is the same with distance education. Today, most people who live with overloaded day today activities have less time to interact and involve with further education. The formal education system can be improved with blended learning. Factors such as increasing student participation, diversified student population, shirking space of education institutes and limited time for studies, are important for OUSL to adopt innovative techniques. It is an initiative to face the future demands and trends in higher education and will definitely improve the student performance and the overall image of the distance education study programmes.

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