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Course Reduction Can Reduce Failure Rates of Students: Lessons from The Study of an E-Learning University of Pakistan

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Abstract

Low degree completion rate within the prescribed time due to exceedingly large failure rate of students has become a growing concern for Distance Learning Institutes. High failure rate in courses as much as 70% in freshman courses and 60% in advanced courses as the students proceed to final semesters—are costly to both; the institution and the students. Reducing syllabus in the at-stake courses can generate improved results in terms of students' passing ratio. Following this hypothesis, current course-redesign intervention employed 30% reduction in the course content to evaluate its impact on students' failure rate. Results were compared against a set of courses in the control group and also with pre-intervention results of students in the same courses. Independent sample t-test and chi-square test of homogeneity were used in the SPSS to determine the intervention impact. Results were significant against all the hypotheses hence allowing the researchers to conclude that course reduction intervention has significant bearing on reducing students' failure rate.

Keywords: Course Reduction, E Learning, Student Failure

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Introduction

Out of Pakistan's total population, only 5.5% enroll in tertiary education i.e. in universities and colleges' degree awarding programs. But the graduation rate of these students out of Pakistan's total population is only 3.9%. Others are dropped out of the educational programs due to their low percentage scores in courses or due to failing multiple courses in semesters. Online universities in Pakistan no doubt have increased the students' access to higher education. However, high failure rate reduces the likelihood of successful completion of courses and degree programs, thereby following the promises of increased access.

Low bachelor's degree completion rate within the prescribed time due to this exceedingly large failure rate of students has become a growing concern for Distance learning institutes. We are short of statistics, but few inferences can be drawn from the admission statistics of students and the number of students graduating every year. These figures present a dismal picture:

Table1
%
Admission and graduation rates at an Open University of Pakistan

	1999-2000	**2000-1**	**2001-2**	**2002-3**	**2003-4**
Admissions	310890	357595	335025	399560	512635
All qualifications awarded	62540 (20.11%)	89069 (24.9%)	80114 (23.91%)	89069 (22.29%)	95787 (18.68%)

This low rate of degree awarding suggests that Distance learning universities are producing considerably fewer graduates than what is expected from their large enrolment statistics. Seeing this high disparity between the admission and graduation rates, Reddy and Menjulika (2002) drew a conclusion that overall 91 percent of those students who get admission in distance learning universities either end up as dropouts or, due to multiple times failing different courses, are unable to get their degree within the prescribed time period. Such a high dropout and failure rate erodes the economic advantage which comes with distance education.

High failure rate in courses as much as 70% in freshman courses and 60% in advanced courses as the students proceed to final semesters are costly to both; the institution and the students. Drop out ratio in the freshman year also presents a dismal picture. Under these circumstances, overloaded course content turns out to be part of the problem of growing failure rate of students rather than presenting any solution. By and large, universities have not yet begun to realize the benefit of well-structured and concise syllabus to increase student retention, to improve the quality of student learning, to reduce the failure rate of students and hence the associated costs of learning. This particular project aims at experimenting with the course reduction technique to address the issue.

This course-redesign project focused on large-enrollment, introductory, intermediate, and advanced level courses that not only had significant student numbers but also the high failure rate of students. Hence, these could rightly be called as at-stake courses.

Following statistics from past five (05) years confirm our initial observation.

Table 2

Failure rate of students over different semesters

Subjects	**Failure Rates %**					
	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Fall 2015
ECO401	43.802	39.659	46.179	38.129	65.966	73.028
MGT201	50.82	45.556	51.255	46.184	75.292	88.78
MGT503	31.38	36.241	32.614	49.143	60.482	60.132
STA630	59.22	43.801	55.056	49.361	62.933	70.301
ECO404	28.57	18.269	27.817	16.558	32.461	65.789
MGT211	18.35	17.845	25.73	21.412	35.498	59.774

As can be seen from the above table that overall failure rate is rising with each passing year. And failure rate as high as 88% in some courses is alarming for educationists as well as for students. Reducing syllabus in these courses might generate improved results in terms of students' passing ratio. These courses were targeted because undergraduate enrollment in these courses was highest.

The insight that these figures generate is simple and convincing: To ensure that intervention program has considerable impact on maximum students, an institution should introduce redesigning methodology in those courses which suffer higher failure rate with greatest enrollment. Putting energy into technological investments in disparate small-enrollment courses will only end up in having minimal influence. Proceeding in this manner, the intervention strategy can literally affect most of the students who attend. This intervention in undergraduate courses has its roots in the philosophy that institutions adopting proactive approach to deal with students' problems will generate better outcomes. There is sparse research literature found on university students' failure. The issue might not have received attention from the researchers and academicians equally because it might bring embarrassment to the academic institutions. Initially in 1970s and 1980s, failure rate of students was studied under the domain of attrition/retention research (e.g., Tinto, 1987). However, these preliminary researches interpreted attrition as a phenomenon of inability of students to get accustomed to the university environment ignoring the institutional or course content issues. The study was initiated as an effort to comprehend student academic failure in Management Faculty of the university. Concerns had been conveyed at numerous assessment boards over increase of failure rate in different degree programs. A specific aim of this research was to investigate whether the factor of courses length facilitated the failure. Particularly does the reduction in course content improve the student performance in terms of earning their cumulative marks?

Active institutional intervention has been suggested by the literature to prevent failure rate of students in a planned and conscious manner. For instance, Martin (2002) introduces the concept of "resilience" for institutions to design strategies aiming to decrease risk of students' failure, while augmenting preventive measures at the same time which either help students in achieving success in the first instance or assist them to better recover in case they face academic disappointments. In fact, Peelo and Wareham (2002) emphasize practicing academic 'survival' activities in their work, after recognizing the everyday nature and gravity of failure. They advise academic institutes to assist students to "bounce back".

Nevertheless, the research on students' failure and the underlying reasons of that failure remains underdeveloped and patchy. Current study authenticates that there exists compounding relationship between student failure (and conversely – success) and lengthy course content. Thus, although students' attributes/background determine academic failure, the prospects of students being awarded with particular grades is also largely dependent upon many institutional factors like the program/course in which they are enrolled and the course contents.

Objectives of Study

i. To evaluate the effect of course reduction intervention on students' failure rate.

ii. To compare the effect of the intervention in the control and experimental group.
iii. To evaluate the effect of intervention on grade improvement.

Literature Review

The study conducted at three Australian universities reveal that most common causes of failure among students are heavy workload, fear to get failed, demotivation, doubts about academic ability, apprehension and tension (Mullins, Quintrell & Hancock, 2013).

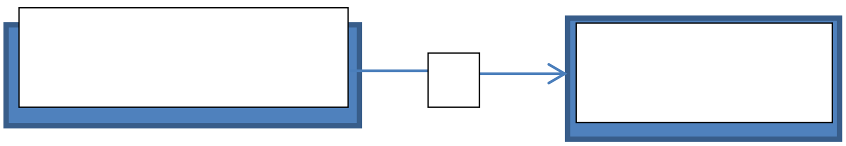
Garg et al., (1992) identify that subject matter difficulty influences the perception of students and hence their interest towards some specific subject. Curriculum content reduction is also considered a crucial element in this regard. Deep learning needs huge time investment (Entwistle, 1998). Students with overloaded curricula do not have sufficient time to do task, reflect and apply information in different contextual environments, leaving them with inadequate understanding of concepts (Gardner, 1993). For a deeper understanding of students, researchers in education field have used the phrase “cover less, uncover more” (Case, Lewis, Fraser, & Jawitz, 1999; Case & Gunstone, 2002). Cope and Staehr (2005) have noticed improvement in learning in their study after careful selection and deduction of content. Ramsden (1988) argues that orientation of student of study (deep vs. superficial) besides other aspects, depends on the curriculum. The reason is that the curriculum is proved to be the only factor which can be controlled by the lecturer in the learning environment (Cope & Staehr, 2005). Also, keeping students overburdened with excessive curriculum contents may keep them cognitively overwhelmed (Feldon, 2007), which can affect learning and performance. Heavy course curriculum as a reason of failure has also been identified by Fraser (2003). He mentions that heavy curriculum is the major reason of the students to leave the school and students leave the school because they fail the examination (Heublein et al., 2003). A study conducted by Cox (1994) highlights the fact that if there is high failure rate among students then there must be something wrong, it can be problem with course structure or syllabus consisting of heavy course content. Biggs (2005) has noticed that if we provide more content to study then there will be less knowledge, or there will be more in depth knowledge if less content is given.

Moreover, it does not refer to just the reduction of the content, rather enhancing the future by implanting the work based skills (Candy & Crebert, 1991; Lizzio et al., 2002). Therefore, it is required to maintain balance of breadth and depth of the course contents so that sufficient workload and necessary skills can be implanted (Lizzio et al., 2002). Therefore, it is essential to identify the important dimensions of the syllabus (Cope & Staehr, 2005; Paakkari, Tynjala, & Kannas, 2010) which are necessary for students to attain the projected outcomes.

Greening (1998) suggests that switching from the content centered learning to the Problem Based Learning (PBL) needs a slow start in terms of contents. This is for the development of necessary skills in the students. According to him, the reduction in the content should be introduced in the first year courses, the author also adds that this reduction should be in first year courses, also PBL needs to be more structured and students should be more carefully guided.

Hypothesis

Reduction in course content is likely to reduce the failure rate of students.



Design

The purpose of the present study was to study the effects of reducing course content on the failure rate of students. Fixed number of 45 lessons in each course had always been a part of the syllabus. This limitation had become an obstacle in the way of students to complete their degrees. So there was a need to study the effect of reduced course content on the failure rate. Learning theories also reinstate the point that the main purpose of the teaching is to increase and persuade the learner to profound learning instead of a superficial one (Karjalainen, 2004).

Sample

This study utilized results of twelve (12) academic courses with largest enrollment~~s~~ between 2011 and 2016. Out of these 12 courses, 6 courses were included in the experimental group and the exam results of rest of 6 courses were used as control group data. Control data is introduced to make a fair comparison and to eliminate the possibility of a particular year's intake of students being smarter than the others. Because in case of reduction in failure rate, results authenticity can be challenged that improvement in grades is not solely due to the intervention technique but only because the students are better. The sample included both theoretical and technical courses. Mix of theoretical and technical courses are drawn to generate a representative sample of the academic courses taught. Further the courses are picked from different semesters to reduce the experimental bias and to make comparison between results of different semesters. Selected this way, details of courses of both groups are as below in Table 3:

Course Code	**Group**	**Course Name**	**Nature**	**Semester Offered**
ECO401	Experimental	Economics	Theoretical	1^{st}
MGT201	Experimental	Financial Management	Numerical	2^{nd}
ECO404	Experimental	Managerial Economics	Mix	4^{th}
STA630	Experimental	Research Methods	Mix	2^{nd}
MGT503	Experimental	Principles of Management	Theoretical	2^{nd}
MGT211	Experimental	Introduction to Business	Theoretical	1^{st}
ECO402	Control	Micro Economics	Mix	2^{nd}
ACC501	Control	Business Finance	Numerical	3^{rd}
FIN622	Control	Corporate Finance	Numerical	4^{th}
MGT603	Control	Strategic Management	Theoretical	3^{rd}
MGT501	Control	Human Resource Management	Theoretical	2^{nd}
MGT301	Control	Principles of Marketing	Theoretical	1^{st}

We restrict our analysis to the set of courses at undergraduate level only to ensure that the grades used for defining course success or failure come from similar courses at the similar level. Using online grades from courses that were substantially different or at different levels would introduce a potential source of error. Multi-level analysis is not appropriate as the students at the graduate level are more learned than those at the undergraduate level.

The study actually investigated the impact of a one-semester intervention program undertaken to reduce the failure rate of students in 6 selected courses in an E-Learning Based University of Pakistan. The intervention program involved 30% reduction in the syllabus of few selected courses by subject experts. Pre and post-intervention comparison was made between the results of these courses. The reduced syllabus was the first tangible outcome of this initiative. University courses seeking to use the reduced syllabus were revised according to the particular needs of a discipline. Instructors reviewed the topical syllabus and based on their judgment and perceived needs of the students deleted the topics. Some changes in paper designing at the lowest level were also the integral part of this.

The concept was to provide students with an education stressing the technical fundamentals, and preparing them to be successful in their semesters with good passing marks. The methodology involved three constituent elements:

- Curriculum redesign,
- Continuous assessment

First objective in this regard was to outline the content of the syllabus and to determine a process employed to derive it. The enhanced degree of students' proficiency is the motivating impetus behind this. The reduced syllabus was an inventory of topics, established through a consensus process to be the most relevant list of knowledge, skills and aptitudes to be exhibited by the graduating students. While organizing and assembling the syllabus content, researchers' objective was threefold:

- *To design a syllabus structure whose rationale is obvious while simultaneously maintaining a sense of business education essence*
- *To develop a comprehensive set of goals in accordance with this modified syllabus*
- *To derive an exhaustive, clear and consistent list of topics that not only facilitates implementation but is significant in students' assessment as well.*

Comparison of exam results was based upon the following techniques:

1. In order to make comparison with the control data, relative grades were used. The rationale behind this was that the relative grades were the "official grades" which were awarded to eliminate marking variation effects of different teachers of the same course and between different courses. In this way, students of current semester receiving treatment or not were assessed relative to their peers and comparison between experimental and control groups was at par.
2. While making comparison between current semester students' results and previous semester students' results in the same courses, raw failure rate of the students was used. Because, previously students' assessment scheme was different and comparing different grading criterion was faulty. Such comparison evaluated the direct impact of course reduction intervention introduced in the selected courses.

Hypothesis

Our prime objective of this study was to evaluate the effect of course reduction intervention on students' failure. For this purpose, we state the following hypotheses:

Ho1: There is no significant difference between the mean score of students for the experimental and control group of courses.

Ha1: There is a significant difference between the mean score of students for the experimental and control group of courses.

Ho1.1: μ (ECO401) = μ (ECO402)
Ha 1.1: μ (ECO401) $\neq$ μ (ECO402)

Ho1.2: μ (MGT201) = μ (ACC501)
Ha 1.2: μ (MGT201) $\neq$ μ (ACC501)

Ho1.3: μ (ECO404) = μ (FIN622)
Ha 1.3: μ (ECO404) $\neq$ μ (FIN622)

Ho1.4: μ (STA630) = μ (MGT603)
Ha 1.4: μ (STA630) $\neq$ μ (MGT603)

Ho1.5: μ (MGT503) = μ (MGT501)
Ha 1.5: μ (MGT503) $\neq$ μ (MGT501)

Ho1.6: μ (MGT211) = μ (MGT301)
Ha 1.6: μ (MGT211) $\neq$ μ (MGT301)

Ho2: There is no significant difference between the mean score of students for the two semesters in the experimental course group.

Ha2: There is a significant difference between the mean score of students for the two semesters in the experimental course group.

Ho2.1: μ (ECO 401 in Spring 2016) = μ (ECO401 in Fall 2015)
Ha 2.1: μ (ECO401 in Spring 2016)) $\neq$ μ (ECO401 in Fall 2015)

Ho2.2: μ (MGT201 in Spring 2016) = μ (MGT201 in Fall 2015)
Ha 2.2: μ (MGT201 in Spring 2016) $\neq$ μ (MGT201 in Fall 2015)

Ho 2.3: μ (ECO404 in Spring 2016) = μ (ECO404 in Fall 2015)
Ha 2.3: μ (ECO404 in Spring 2016) $\neq$ μ (ECO404 in Fall 2015)

Ho 2.4: μ (STA630 in Spring 2016) = μ (STA630 in Fall 2015)
Ha 2.4: μ (STA630 in Spring 2016) ≠ μ (STA630 in Fall 2015)

Ho 2.5: μ (MGT503 in Spring 2016) = μ (MGT503 in Fall 2015)
Ha 2.5: μ (MGT503 in Spring 2016) ≠ μ (MGT503 in Fall 2015)

Ho2.6: μ (MGT211 in Spring 2016) =: μ (MGT211 in Fall 2015)
Ha 2.6: μ (MGT211 in Spring 2016) ≠ μ (MGT211 in Fall 2015)

Ho3: There is no significant difference between the proportion of students getting F grade in the experimental course group and control course group.
Ha3: There is a significant difference between the proportion of students getting F grade in the experimental course group and control course group.

Ho3.1: proportion of students getting F grade in ECO401 = proportion of students getting F grade in ECO402
Ha 3.1: proportion of students getting F grade in ECO401 ≠ proportion of students getting F grade in ECO402

Ho3.2: proportion of students getting F grade in ECO404 = proportion of students getting F grade in FIN622
Ha 3.2: proportion of students getting F grade in ECO404 ≠ proportion of students getting F grade in FIN622

Ho3.3: proportion of students getting F grade in MGT201 = proportion of students getting F grade in ACC501
Ha 3.3: proportion of students getting F grade in MGT201 ≠ proportion of students getting F grade in ACC501

Ho3.4: proportion of students getting F grade in MGT211 = proportion of students getting F grade in MGT301
Ha 3.4: proportion of students getting F grade in MGT211 ≠ proportion of students getting F grade in MGT301

Ho3.5: proportion of students getting F grade in MGT503 = proportion of students getting F grade in MGT501
Ha 3.5: proportion of students getting F grade in MGT503 ≠ proportion of students getting F grade in MGT501

Ho3.6: proportion of students getting F grade in STA630 = proportion of students getting F grade in MGT603

Ha 3.6: proportion of students getting F grade in STA630 ≠ proportion of students getting F grade in MGT603

Analysis and Discussion

One of our objectives of the study was to compare the effect of the intervention in control and experimental group. For this the mean scores of two courses (Experimental vs Control group) are calculated, and independent t-test is applied in order to know that whether there exists a significant difference between them. Overall score of students in exam is taken as an indicator of performance. Twelve courses are taken for the study, six of them are categorized in experimental group and six are in control group. There are six courses of technical nature grouped into experimental and control group based on the fact whether intervention is applied or not. The first three sets of courses of such nature are ECO 401 vs ECO 402, MGT201 vs ACC501, and ECO404 vs FIN622. Similarly, the other three sets of the courses grouped as theoretical courses are STA630 vs MGT603, MGT503 vs MGT501, and MGT211 vs MGT301.

Table 4

Mean score comparison between courses in experimental and control group

Group	COURSE	N	Mean	Std. Deviation	Std. Error Mean
Experimental	ECO401	1795	27.1927	6.98856	0.16495
Control	ECO402	654	23.2855	7.17857	0.2807
Experimental	MGT201	1895	25.452	6.58412	0.15125
Control	ACC501	1260	22.0018	7.33701	0.2067
Experimental	ECO404	401	28.5437	7.10521	0.35482
Control	FIN622	263	25.2775	7.11091	0.43848
Experimental	STA630	1020	27.7238	7.32686	0.22941
Control	MGT603	631	26.097	7.11518	0.28325
Experimental	MGT503	1087	28.9919	6.78882	0.20591
Control	MGT501	1521	27.9526	6.68411	0.17139
Experimental	MGT211	757	28.3368	6.82538	0.24807
Control	MGT301	1698	27.8958	6.72735	0.16326

The mean scores of students of ECO401 (Experimental group) is 27.19 which is higher than the mean score of students in ECO 402. Though the difference is of almost 4 marks but still an improvement has been observed. Similarly, the means scores of MGT201 (Experimental group) i.e. 25.45 is higher than the mean score of ACC501 (control group) which is 22. Likewise, a difference in means also exists in ECO 404 and FIN622. From the table 3 it can be seen that the means are 28.54 and 25.28 respectively which shows that the students performed better in the course in which intervention was applied than the course in which there was no intervention. The six (06) courses mentioned earlier were of technical nature. However, if mean scores of courses of theoretical nature are compared, the same kind of trend can also be seen in them. STA630 mean score (27.72) was higher than MG603 mean score (26.1), similarly, MGT503 mean score when compared with MGT501 shows that students' performance is low in later. The last two courses of theoretical nature taken in our study are MGT211 and MGT 301. The trend in their mean scores is somewhat same. 28.34 is the mean score in MGT211 which is higher than the MGT301 which is 27.89. The means difference tells that an average improvement of about 3 to 4 marks has been observed. Therefore, our findings suggest intervention of course reduction can also be one of the factors in improving the performance of students. However, Ayesan, et al (2008) have identified other factors causing failure among students along with course content such as behavior of teacher, examinations, teaching methods, low level of commitment to study, and psychological problems. Table 3 only showed the difference in mean scores but in order to know if there exists a significant difference between the mean scores, independent t-test is applied. The independent sample t-test scores are shown in table 4.

Table 5

Independent sample t-test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% C.I of Difference	
									Lower	Upper
ECO401 vs ECO 402	Equal variances assumed	1.544	.214	12.152	2447	.000	3.90722	.32154	3.27671	4.53773
	Equal variances not assumed			12.001	1132.683	.000	3.90722	.32558	3.26841	4.54603
MGT201 vs ACC501	Equal variances assumed	3.543	.060	13.767	3153	.000	3.45021	.25062	2.95881	3.94161
	Equal variances not assumed			13.471	2493.085	.000	3.45021	.25612	2.94798	3.95245
ECO404 vs FIN622	Equal variances assumed	.820	.365	5.792	662	.000	3.26628	.56396	2.15891	4.37365

	Equal variances not assumed			5.791	560.144	.000	3.26628	.56405	2.15836	4.37420
STA630 vs MGT603	**Equal variances assumed**	.847	.358	4.432	1649	.000	1.62674	.36703	.90685	2.34663
	Equal variances not assumed			4.463	1364.596	.000	1.62674	.36450	.91169	2.34178
MGT503 vs MGT501	**Equal variances assumed**	.737	.391	3.889	2606	.000	1.03925	.26721	.51528	1.56322
	Equal variances not assumed			3.879	2317.321	.000	1.03925	.26790	.51390	1.56461
MGT211 vs MGT301	**Equal variances assumed**	.326	.568	1.493	2453	.136	.44098	.29533	-.13814	1.02010
	Equal variances not assumed			1.485	1432.922	.138	.44098	.29697	-.14157	1.02353

Table 4 shows the Levene's test for equality of variances and t-test for equality of means. Equal variances are assumed for all the cases as sig values are greater than 0.05.

The Sig. (2-Tailed) value in table 4 of ECO 401 and ECO402 is 0.00 which is less than 0.05. From this, it can be concluded that there is a statistical significant difference between the mean scores of students in ECO401 and ECO402. As the table 3 shows that there exists a difference between mean scores, but from the table 4 it is inferred that the difference is not due to chance but the intervention; reduction in course content; created that difference. Similarly, if the results of other two sets of courses of technical nature; MGT201 vs ACC501 and ECO404 vs FIN622, are observed then they also show a statistically significant difference between the mean scores. The same results appeared in theoretical courses except in case of MGT211 and MGT301 where there is no statistical significant difference between the mean scores as Sig. (2-Tailed) value is 0.136 which is greater than 0.05. There can be reasons other than heavy course content that leads to statistically insignificant difference in this case. This claim is strengthened by the perception of attribution theorists who argue that other factors contributing to the failure and success of students are ability, effort, difficult course content (Weiner, 1980). Whereas, a statistical significant difference exists between the mean scores of STA630 and MGT603. Results of independent t-test of MGT503 vs MGT501also show that there exists a significant difference between the mean scores.

The semester wise performance of students in courses ECO401, MGT201, ECO404, STA630, MGT503, AND MT211 has also been compared by doing mean comparison and by applying independent sample t-test.

Table 6

Year wise independent t-test

courses	YEAR	N	Mean	Std. Deviation	Std. Error Mean
ECO401	SPRING2016	2584	34.6459	13.90400	.27352
	FALL2015	1911	32.9814	13.75325	.31461
MGT201	SPRING2016	2119	27.9819	10.01339	.21753
	FALL2015	1886	26.8163	10.24559	.23592
ECO404	SPRING2016	675	38.5644	15.32182	.58974
	FALL2015	684	36.2770	13.72049	.52462
STA630	SP16	1527	35.6781	14.01701	.35870
	FA15	1699	34.0909	13.96521	.33881
MGT503	SPRING2016	2095	40.5510	14.97452	.32716
	FALL2015	1981	37.6696	14.26793	.32057
MGT211	SPRING2016	1525	41.3735	15.61669	.39990
	FALL2015	1421	37.1898	14.25598	.37818

When the mean scores of students in semester Spring 2016 are compared with Fall 2015, there appears a higher mean score in Spring 2016 than of Fall 2015 for all the courses. The mean score of students of ECO401 in Spring 2016 is 34.65 which is higher than the mean score in Fall 2015.

Similarly, the mean score of MGT201 in Spring 2016 i.e. 27.98 is higher than the mean score in Fall 2015 which is 26.81. Also a difference in means exists in students' performance in ECO404 in Spring 2016 and Fall 2015. Table 5 shows that the means are 38.6 and 36.2 respectively which tells that the students performed better in semester when intervention is applied than in the semester in which there is no intervention. However, if mean scores of STA630 in two semesters mentioned earlier are compared, the same kind of trend can also be seen in them. STA630 mean score (35.7) in Spring 2016 is higher than mean score (34.1) in Spring 2016. The trend in other two courses; MGT503 and MGT 211 is somewhat same. 40.6 is the mean score in MGT503 in Spring 2016 which is higher than the fall 2015 mean which is 37.7. The students' performance measured by calculating mean scores in course MGT211 shows that in Fall2015 it was lower when compared with that of Spring 2016. Table 6 shows the results of independent t-test in order to know if there exists a significant difference between the mean scores when semester wise comparison is done.

Table 7

Independent sample t-test

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
COURSES		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
ECO401	Equal variances assumed	0.703	0.402	3.986	4493	0	1.6645	0.41757	0.84586	2.48314
	Equal variances not assumed			3.993	4139.712	0	1.6645	0.41689	0.84718	2.48182
MGT201	Equal variances assumed	0.634	0.426	3.637	4003	0	1.16564	0.32047	0.53733	1.79394
	Equal variances not assumed			3.632	3926.66	0	1.16564	0.3209	0.53649	1.79478
ECO404	Equal variances assumed	5.218	0.023	2.9	1357	0.004	2.28736	0.78874	0.74009	3.83463
	Equal variances not assumed			2.898	1336.739	0.004	2.28736	0.78931	0.73894	3.83578
STA630	Equal variances assumed	0.082	0.775	3.217	3224	0.001	1.58722	0.49332	0.61998	2.55447
	Equal variances not assumed			3.217	3185.099	0.001	1.58722	0.49341	0.61978	2.55466
MGT503	Equal variances assumed	6.367	0.012	6.282	4074	0	2.88139	0.45866	1.98217	3.7806
	Equal variances not assumed			6.291	4073.763	0	2.88139	0.45804	1.98339	3.77939
MGT211	Equal variances assumed	22.182	0	7.577	2944	0	4.18373	0.55217	3.10104	5.26641
	Equal variances not assumed			7.601	2942.766	0	4.18373	0.5504	3.10451	5.26294

Table 6 depicts the Levene's test for equality of variances and independent sample t-test for equality of means. Equal variances are assumed for ECO401, MGT201 and STA630 as sig values in these cases are greater than 0.05. For the rest of the courses; MGT503, MGT211 and ECO404 equal variance are not assumed. The results of independent sample t-test show that there exists a significant difference in mean scores of all the courses in Spring 2016 and Fall 2015. It can be inferred that the difference is not due to chance and the intervention i.e. reduction in course content, created that difference.

The results predicted that performance of students in courses included in experimental group was higher than the performance in courses in control group. Although the mean difference is not too large but a significant rise in performance has been observed by introducing the intervention. However, the results support the earlier findings of Cope and Staehr (2005) who noticed improvement in learning in their study after careful selection and deduction of content. The study also involved a comparison between performances of students in one semester with performance in other semester. In semester Spring 2016, an intervention in terms of course reduction is applied while in previous semester i.e. Fall 2015, no such intervention was applied. The semester wise comparison brought same kind of results. There is an increase in mean scores of students in Spring 2016 than in Fall 2015. This shows that students get more understanding of concepts if reasonable and carefully selected content is provided to them. The results are in line with study done earlier by Case & Gunstone, (2002) who say that "cover less, uncover more".

Table 8

Contingency table for improvement in grades of ECO 401 vs ECO 402

		GRADES					**Total**
		F	D	C	B	A	
ECO401	Count	1794	411	276	82	19	2582
	Expected Count	1882.3	366.8	246.1	72.3	14.6	2582.0
	% within COURSE	69.5%	15.9%	10.7%	3.2%	.7%	100.0%
ECO402	Count	654	66	44	12	0	776
	Expected Count	565.7	110.2	73.9	21.7	4.4	776.0
	% within COURSE	84.3%	8.5%	5.7%	1.5%	.0%	100.0%

The table 7 depicts that there is an improvement in overall grades of students in experimental group course where intervention of course reduction is applied. The percentage comparison is showing that in ECO 401 the percentage of F grade is 69.5% which is lesser than F grade percentage of 84.3%. On the other hand, the percentage in grades D, C, B, A is greater in course ECO 401 than in ECO 402.

Table 9

Chi square table

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	68.147[a]	4	.000
Likelihood Ratio	77.365	4	.000
Linear-by-Linear Association	56.678	1	.000
N of Valid Cases	3358		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.39.

A chi square sig value of 0.000 shows that our hypothesis Ha 3.1, that there is a significant difference between the proportion of students getting F grade in the experimental group course (ECO401) and control group course (ECO402) has been proved, $X^2(4, N = 3358) = 68.147, p <. 05$

Table 10

Contingency table for improvement in grades of ECO 404 vs FIN622

			GRADES					Total
			F	**D**	**C**	**B**	**A**	
COURSE	**ECO404**	Count	401	130	90	47	7	675
		Expected Count	446.0	110.1	78.6	35.6	4.7	675.0
		% within COURSE	59.4%	19.3%	13.3%	7.0%	1.0 %	100.0%
	FIN622	Count	263	34	27	6	0	330
		Expected Count	218.0	53.9	38.4	17.4	2.3	330.0
		% within COURSE	79.7%	10.3%	8.2%	1.8%	.0%	100.0%

Similar results have been found when we compare grades percentages in ECO404 and FIN622. The comparison of grades percentages is showing that in ECO404 the percentage of F grade is 59.4%. However, in FIN622, it is 79.7. This shows that F grade has reduced in course when course reduction is done as compared to the course where no intervention was applied. The grades D, C, B, A are higher in course ECO404 than in FIN622.

Table 11

Chi square table

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	44.304[a]	4	.000
Likelihood Ratio	49.493	4	.000
Linear-by-Linear Association	38.130	1	.000
N of Valid Cases	1005		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.30.

The hypothesis 3.2 was to determine that if there was a statistically significant difference between the proportion of students getting F grade in the experimental group course (ECO404) and control group course (FIN622). The difference in proportion of students getting F grade was statistically significant, $X^2(4, N = 1005) = 44.304, p < .05$.

Table 12

Contingency table for improvement in grades of MGT201 vs ACC501

			GRADES					Total
			F	**D**	**C**	**B**	**A**	
COURSE	**MGT201**	Count	1895	134	76	13	1	2119
		Expected Count	1899.3	127.6	74.0	17.5	.6	2119.0
		% within COURSE	89.4%	6.3%	3.6%	.6%	.0%	100.0%
	ACC501	Count	1260	78	47	16	0	1401
		Expected Count	1255.7	84.4	49.0	11.5	.4	1401.0
		% within COURSE	89.9%	5.6%	3.4%	1.1%	.0%	100.0%

The table 11 depicts that there has been an improvement in overall grades of students but the difference is minute. The percentage in grades D, C, B is greater in course MGT201 than in ACC501.

Table 13

Chi square table

Chi-Square Tests	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.476[a]	4	.345
Likelihood Ratio	4.763	4	.313
Linear-by-Linear Association	.010	1	.919
N of Valid Cases	3520		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is .40.

As the Sig. value is greater than 0.05, therefore, our hypothesis is not approved and it is concluded that the difference in proportion of students getting F grade is not significant $X^2(4, N = 3520) = 4.476, p > .05$.

Table 14

Contingency table for improvement in grades of MGT211 vs MGT301

			GRADES					Total
			F	**D**	**C**	**B**	**A**	
COURSE	**MGT211**	Count	757	296	348	112	12	1525
		Expected Count	922.4	299.8	237.8	60.1	4.9	1525.0
		% within COURSE	49.6%	19.4%	22.8%	7.3%	.8%	100.0%
	MGT301	Count	1698	502	285	48	1	2534
		Expected Count	1532.6	498.2	395.2	99.9	8.1	2534.0
		% within COURSE	67.0%	19.8%	11.2%	1.9%	.0%	100.0%

The comparison of grades of MGT211 and MGT311 shows that percentage of F grade is far less in MGT211 than in MGT301. Similarly, the overall grades D, C, B, A have also been improved in course where course was reduced rather in course where there was no intervention.

Table 15

Chi square table

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	217.671[a]	4	.000
Likelihood Ratio	213.978	4	.000
Linear-by-Linear Association	206.241	1	.000
N of Valid Cases	4059		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.88.

A chi square sig value of 0.000 shows that the difference in proportions of students getting F grade was statistically significant, $X^2(4, N = 4059) = 217.61, p < .05$.

Table 16

Contingency table for improvement in grades of MGT503 vs MGT501

			GRADES					Total
			F	**D**	**C**	**B**	**A**	
COURSE	**MGT503**	Count	1087	447	394	147	17	2092
		Expected Count	1281.9	406.0	304.8	90.4	8.8	2092.0
		% within COURSE	52.0%	21.4%	18.8%	7.0%	.8%	100.0%
	MGT501	Count	1521	379	226	37	1	2164
		Expected Count	1326.1	420.0	315.2	93.6	9.2	2164.0
		% within COURSE	70.3%	17.5%	10.4%	1.7%	.0%	100.0%

The table 15 shows that there is an improvement in overall grades of students in experimental course group where intervention of course reduction is applied. The percentage comparison is showing that in MGT503 the percentage of F grade is 52% which is lesser than F grade percentage of 70.3%. On the other hand, the percentage in grades D, C, B, A is greater in course MGT503 than in MGT501 which shows an improvement in grades.

Table 17

Chi square table

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	202.166[a]	4	.000
Likelihood Ratio	210.649	4	.000
Linear-by-Linear Association	200.446	1	.000
N of Valid Cases	4256		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.85.

A chi square sig value of 0.000 shows that our hypothesis, there is a significant difference between the proportions of students getting F grade in the experimental group course (MGT503) and control group course (MGT501) has been proved, $X^2(4, N = 4256) = 202.166$, $p <. 05$

Table 18

Contingency table for improvement in grades of STA630 vs MGT603

			GRADES					Total
			F	**D**	**C**	**B**	**A**	
COURSE	**STA630**	Count	1020	265	179	56	7	1527
		Expected Count	1076.9	240.7	158.5	46.3	4.6	1527.0
		% within COURSE	66.8%	17.4%	11.7%	3.7%	.5%	100.0%
	MGT603	Count	631	104	64	15	0	814
		Expected Count	574.1	128.3	84.5	24.7	2.4	814.0
		% within COURSE	77.5%	12.8%	7.9%	1.8%	.0%	100.0%

Similar results have been found when we compare grades percentages in STA630 and MGT603. The comparison of grades percentages is showing that in STA630 the percentage of F grade is 66.8%. However, in MGT603, it is 77.5%. This shows that F grade has reduced in course when course reduction is done as compared to the course where no intervention was applied. The proportion of respective grades D, C, B, A is higher in course STA630 than in MGT603.

Table 19

Chi square table

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	32.893[a]	4	.000
Likelihood Ratio	36.113	4	.000
Linear-by-Linear Association	30.246	1	.000
N of Valid Cases	2341		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.43.

A sig value 0.00 shows that there is a statistically significant difference between the proportions of students getting F grade in the experimental group course (STA630) and control group course (MGT603). The difference in proportions of students getting F grade was statistically significant, $X^2(4, N = 2341) = 32.893, p < .05$

Conclusion

The purpose of this paper was to find efficacy of course reduction in decreasing failure rate of students in online distance education. Students fail to complete their degrees due to remarkably high failure rates. This issue has also become a major cause of concern for distance learning institutes. This calls for reduction in syllabus taught to students for final evaluation. An intervention of 30% reduction in syllabus was used to evaluate its impact on students' failure rate. Results were compared in courses in experimental group as well in control group. Independent sample t-test and chi-square test of homogeneity used in SPSS determined that the intervention had a positive impact.

The results of the paper can be concluded in three major categories:

1. The results of courses in experimental and control group showed that there has been a significant difference in mean scores. The mean scores of courses in experimental groups showed improved results as compared to the scores in control group.
2. Similarly, in order to eliminate the possibility of different students in courses in experimental and control group, results are compared with same courses of experimental group in two consecutive semesters. In Spring 2016, course reduction intervention had been applied but in Fall 2015 no such course reduction was done. When results were compared, they showed small but significant difference in mean

scores. Mean scores improved which concludes that intervention proved to be successful.

3. Lastly, to check if the grades were improved with course reduction intervention, proportion of students getting F grade in experimental and control group were compared. There is a major reduction in students getting F grade in courses in the experimental group.

   It is observed that results were significant against all the hypotheses hence allowing the researchers to conclude that course reduction intervention has significant bearing on reducing students' failure rate.

Limitations and Future Research Directions

The limitations of this study are; First, although the experimental design lends credibility to the causal inferences, the results should be generalized with caution because the intervention is performed in only one institute. Hence, future studies can broaden the scope of the study to be conducted simultaneously in various universities for wider generalization. Also, future researchers are invited to compare results of course reduction intervention in traditional versus distance learning institutes. In this way, through careful examination, meaningful results can be drawn about the differences/similarities prevailing in the two modes of delivering education and about how the said intervention works in the two segments.

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