

The Effect of Quiz Frequency on Course Performance and Its Relationship with Class Attendance

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To investigate the effect of quiz frequency on the course performance of Iranian university students of English, the mean scores of five groups of subjects were compared using a balanced one-way ANOVA procedure. Analyses revealed that quizzes significantly improve course performance. With some exceptions, it was also found that the more frequently the subjects were quizzed, the better their course performance became. To study the relationship between quizzes and class attendance, the absences of the same five groups of subjects were regularly checked and compared using the Chi-square procedure. Results showed that there is an inverse relationship between quiz frequency and the number of absences from class.

Keywords: Quiz, Frequency, Class Attendance, Course Performance

Concerns about the effectiveness of university teaching are of long standing. Many traditional instructional approaches respond ineffectively to the learning needs and life situations of today's university students. In recent years, concerns about faculty

members' ability to teach today's students and advances in the cognitive sciences have led to a new interest in learning.

We have stopped assuming that learning is the automatic, inevitable outcome of teaching. Certainly good teaching and learning are related. However, when we make a paradigm shift first proposed by Barr and Tagg (1995) and start with learning, connecting what is known about how people learn to instructional practice, we come at teaching and its improvement from a very different direction (Weimer, 2003).

Cognitive theories subordinate teaching to learning. But while everyone is in favour of learning, at the classroom level not much has changed. Instruction is by and large still about teacher performance. Nothing illustrates this better than the large family of techniques labelled 'active learning' (Weimer, *ibid.*) Yet, even when students participate in the so-called 'active learning' activities, the results of teaching are generally unaffected. This could be partly due to the fact that students, despite their physical participation, do not actually commit themselves to what the teacher thinks they must be doing.

In a fundamental sense, then, although the learning activities and techniques have changed, students continue to be the passive recipients of education rather than active agents in control of their own learning.

What all this boils down to is that in spite of the general agreement about the efficacy of learner-centred education, and that students should be involved in learning, there is not much agreement as to how this goal should be achieved. Nowadays, few teachers disagree that students should be made responsible for their own learning. Yet, the question of how to involve students in learning has so far evoked more controversy than answers.

A number of studies including Brown, Graham, Money, & Mary (1999) and Rose, Hall, Bolen, & Webster (1996) have shown that class attendance has a positive effect on course grades. Other studies (such as Wilder, 2001) have found that the use of quizzes increases student attendance. Some other studies (such as Bishop, 2001; and Clump, 2003) have reported that frequent quizzes significantly improve scores on final examinations.

Background

As we attempt to reach out to students as instructors, we often wonder what is going on in their heads. Our earnest attempts to 'reach them' sometimes succeed but just as often leave them with blank or quizzical faces. We wonder whether we have been clear enough or whether we have used the proper methods. Too often we are left frustrated and either blame ourselves, or more often, the students (Tinberg, 1998).

In an attempt to remedy the situation, we jump hastily from one method to another, or one technique to another. We exhaust all possibilities without managing to bring about much change in students' behaviour and their learning. The result is more frustration and more blame for the students. Interestingly, in this whole process we teachers make mistakes and students get the blame. In our jumps from method to method, we always assume 'This time we have got it right. This is the way to teach; it guarantees success and promises the moon and stars.' But when the moon and the stars are slow to come (if they ever do), upon an honest retrospection, we realise that the previous methods we threw away were just as convincing, as promising as the ones that replaced them. So, where is the problem? What is wrong with our teaching and learning processes? Why do students fail to learn the way they are expected to?

At least part of the answer to the above questions lies in the fact that we usually blame students for something for which they have no responsibility. We do everything for them; we decide what they should do and how; they are only the captive audience of a sole speaker called 'teacher'. No wonder they seek every little opportunity to disappear from the class.

Recent cognitive theories emphasize a learner-centred education in which students are active participants rather than passive audience in the class. A focus on learning requires a set of changes much more profound and far-reaching than can be accomplished by the infusion of new teaching techniques, as relevant to learning as many of them are. Students need to not only engage the material actively, but also take responsibility for their own learning. A commitment to learning challenges teachers to

revisit long-held assumptions about who is responsible for what in the teaching/learning process. It should change how they handle central elements of instruction like course design and assessment, and it should significantly change what teachers do when they conduct class (Weimer, 2003).

Teachers have come to acknowledge that they cannot 'learn' for the students; they can only 'teach'. Learning is to be done only by learners. However, there are things teachers can do that help learners become better learners and achieve better results. One of these things is giving quizzes.

Quizzes can be beneficial in a number of ways. First of all, quizzes supply the motivation for students to attend class. In a study, Wilder (2001) examined the effect of random quizzes on student attendance in an undergraduate course on the psychology of learning. The results indicated that student attendance increased by 10 percent when the quizzes were in place. Hovel, Williams, and Semb (1979) examined the effects of three different quiz contingencies that varied in terms of the number of quizzes and exams that students took during the semester. They found that student attendance hovered around 90 percent for class meetings with a quiz and around 55 percent for non-quiz meetings across the courses. They concluded that grade-related contingencies maintained high overall attendance.

Increased student attendance is unimportant unless it translates into increased learning as measured by improved course performance. The question of whether or not class attendance has an effect on course grades is one that has been asked for decades (Clump, 2003). Jones (1931) investigated this question in 1930s and found a relationship between class attendance and grade point average. He found that the fewer absences a student has during the semester, the higher his/her grade point average. Since Jones' study, a multitude of research studies have also found that class absence is negatively associated with overall course grades (Brown et al., 1999; Rose et al., 1996). Furthermore, the correlation between class absences and course grades accounted for a large portion of the variance in the course grades in many of the studies (Clump, 2003). C. H. Jones (1984) examined the correlation

between attendance before an exam and the students' score on the next exam. He found that there were significant negative correlations between exam scores and absences before the exam. A number of other studies have reported a positive relationship between class attendance and course performance (Van Blerkom, 1992). However, a dearth of research exists on methods to increase student attendance. Wilder's (2001) analyses revealed a significant correlation coefficient (.73) between frequency of student attendance and total course points, indicating that student attendance was positively related to course performance.

Clump (2003) investigated the effect of attending class in a general psychology course. He compared the students who were present on days in which unannounced quizzes were given with those students who were not present. For two of the three quizzes, being present on a quiz day significantly increased subsequent test scores over the material. In addition, there was a significant effect of attendance on overall test scores in the class. The students who were present for all three quizzes had significantly higher overall test scores than other students. He then concluded that even in the era where students could gain immediate access to course information, student attendance remained essential for success in a course.

One question that arises from the negative relationship between absences and course grades is whether lower grades are a result of increased class absences, or conversely, whether lower class grades lead to increased class absences. C.H. Jones (1984) found support for both causal models. This implies that quizzes can improve course performance by increasing student attendance.

A similar argument can be put forward as to the relationship between motivation and learning. Many scholars including Chastain (1988) have concluded that motivation improves learning and course grades. Based on what was said above, it can be convincingly argued that motivation is not always the cause of good grades; it may well be the result of them. This defines another positive feature of quizzes. Quizzes increase course grades by supplying motivation, and motivate students to study by improving their grades. That is to say, students often lose their

motivation to study because of lack of knowledge. For one reason or another, they may procrastinate until the eve of the exam and let the learning materials accumulate. They decide to study only when it is too late. The result is poor grades, which negatively influence motivation, which further deteriorates grades.

What quizzes do is to encourage students to keep up with the reading (Weimer, 2003). The result of reading is learning, and learning improves both course grades and motivation. Moreover, since quizzes usually cover less learning material than final exams, it is easier to get good grades on quizzes. If students are pushed to study by frequent quizzes, not only will they maintain their motivation, they will also find the final examination much easier because they will not have to cram for it. Thus, quizzes also reduce the probability of meaningless cramming on the eve of the final examination.

Anyway, there is ample evidence that quizzes increase students' overall course grades. Graham (1999) found that quizzing students on material that would be covered on the next test led to higher scores on that test. Comparing the achievement of the students in an entirely lecture-based approach with a student engagement approach in which continuous assessment and frequent quizzes are essential pedagogical strategy, Twigg (2003) concluded that the latter approach – referred to as the redesign projects – shows statistically significant gains in overall student understanding of course content as measured by pre- and post-assessments that examine key course concepts. For example, at the University of Central Florida, students enrolled in a traditionally configured political science course posted a 1.6 point improvement on a content examination while the average gain of 2.9 for students in the redesigned course was almost double that amount. Similarly, the University of Tennessee, Knoxville found a statistically significant and favourable 5-point difference between student scores on a redesign-course exam in Spanish and the scores of students enrolled in traditional sections. Twigg (*ibid.*) acknowledges that continuous assessment and feedback is among the most prominent techniques that the redesign projects found to be the most effective in improving student learning. He holds that

shifting from the traditional student assessment approach in large introductory courses, which typically employ only mid-term and final examinations, toward continuous assessment is an essential pedagogical strategy in these redesigns.

In the redesign projects, students are regularly tested on assigned readings and homework using short quizzes that probe their preparedness and conceptual understanding. These low-stakes quizzes motivate students to keep on top of the course material, structure how they study, and encourage them to spend more time on task.

Quizzes also provide powerful formative feedback to both students and faculty members. Faculty members can quickly detect areas where students are not grasping key concepts, enabling timely corrective intervention. Students receive detailed diagnostic feedback that points out why an incorrect response is inappropriate and directs them to material that needs review (Twigg. *ibid.*).

Also, students are usually anxious about final examinations. Quizzes give them clues as to what points are important from their teacher's point of view and are more likely to be included in the final examination. As Chastain (1988) puts it, once they know which parts of the learning material are to be tested, interested students can prepare themselves better for the exam.

Bishop's (2001) analysis of data in forty countries shows that curriculum-based exams do raise achievement. The study found that students from countries with medium- and high-stakes examination systems outperform students from other countries at a comparable level of economic development by 1.3 U.S. grade-level equivalents in science and by 1.0 U.S. grade-level equivalents in mathematics. Analysis of data from the International Association for the Evaluation of Educational Achievement's study of the reading literacy of 14-year-olds in 24 countries found that students in countries with rigorous, curriculum-based exams were about 1.0 U.S. grade-level equivalents ahead of students in nations at comparable levels of development but lacking such exams. Although Bishop's main focus of attention was on curriculum-based exit examination, a careful analysis of the studies referred to above reveals that the efficacy of the exit exam system

was partly due to frequent quizzes. Apparently, teachers subject to the subtle pressure of an external exam adopted strategies that are conventionally viewed as best practices, not strategies designed to maximise scores on multiple-choice tests. Quizzes and tests were more common; otherwise, a variety of pedagogical indicators showed no differences in regions with rigorous exams.

It is obvious, therefore, that quizzes increase course grades. What is less obvious is how frequently quizzes should be given and how students react to quizzes. After all, quizzes have certain limitations and disadvantages too. One of the limitations of giving quizzes concerns the amount of time required to grade them (Wilder, 2001). Particularly when quizzes are given frequently (for example, once a week), a considerable amount of class time will be spent on preparing, administering, and grading them. Of course, as Twigg (2003) points out, online quizzing sharply reduces the amount of time that faculty members need to spend on the laborious process of preparing quizzes, grading them, and recording the results. Yet, as long as quizzing is done manually, a crucial question is whether or not frequent quizzes are worth the amount time spent on them. Critics of the quiz system contend that giving frequent quizzes is doing students a disservice because the class time spent on quizzes could be used for more learning instead of just regurgitating what has been already learnt. Some critics disapprove of giving frequent quizzes on grounds that they reduce the facilitative anxiety essential for successful learning. They hold that a little anxiety is necessary to push students to study. Frequent quizzes make students take exams for granted, thus neutralising the effect of the facilitative anxiety.

In one of the few studies in this respect, Clump (2003) investigated the effect of quiz frequency on students' scores by comparing the students who did not take any quizzes with those who took one quiz, with those who took two quizzes, and with those students who took three quizzes. He found that significant differences existed between the groups, with the group who took three quizzes having significantly higher test scores than the other groups. In addition, the group who took two quizzes had significantly higher overall test scores than the group who did not

take any quizzes. In another study, Zarei (2003) found that regardless of the method of teaching used, the students who were regularly quizzed outperformed those who were not.

The final issue to address is the way students respond to the quiz system. Naturally, due to the bad habit of procrastination, students would like to take as few quizzes as possible. But this is all before the final examination. How students actually feel about quizzes after the final exam, when they realise the effect of quizzes, may well be totally different. In Wilder's (2001) study, student responses to questions about the quiz system were positive. 94% of students in the course reported that they liked the quiz system. In addition, 69% of the students reported that they attended class more often because of the chance to obtain the points associated with the quizzes. 53% of the students admitted that quizzes helped them to keep up with their course reading between exams.

To put everything in a nutshell, many teachers and educators have conceded that habits of procrastination brought from other classes in which it is possible to wait until the eve of examination to cram and then do well on the exam have disastrous results in language classes. To avoid such consequences, language teachers have long had a yearning desire to find a way of getting their students to stop procrastinating and get on with their studies. The purpose of the present study is to investigate the effect of quizzes on increasing class attendance and improving course performance. Attempt will be made to determine the most effective frequency with which to administer quizzes.

Research Questions and hypotheses

In this paper, attempt was made to find convincing answers to the following research questions:

1. Is there any relationship between quiz frequency and students' attendance in language classes?
2. Does quiz frequency affect Iranian university students' course performance?

In so doing, the following null hypotheses were tested:

1. There is no relationship between quiz frequency and class attendance.
2. Quiz frequency does not significantly influence course performance.

Method

Participants

The participants of the study were 183 male and female freshmen in five independent groups who were studying at Imam Khomeini International University in Qazvin. Out of the 183 participants, 68 were male and 115 were female. Two of the five groups (groups 1 and 2) had 35 members each; group 3 had 37 members; and each of the remaining two groups (4 and 5) had 38 members. In order to make computations easier (to run balanced chi-square and ANOVA), two subjects in group 3 and three subjects in each of the groups 4 and 5, were randomly eliminated from calculations.

Instruments

The instruments used in the study included a pre-test, which was a 40-item subtest of the 'Michigan Language Proficiency Test', 18 units (117 pages) of the book 'Aroma : A general English course for university students' which was used as the instructional material, and a 40-item achievement test used as the post-test.

Procedure

Five groups of participants with the afore-mentioned characteristics were randomly selected. To check their entry behaviour and make sure that their knowledge of English was more or less the same, a 40-item subtest of the 'Michigan Language Proficiency Test' was administered. Using the ANOVA procedure, the means of the groups were compared. The observed value of F turned out to be .91, indicating that the difference between the groups was not statistically significant.

Then all groups received the same instruction (18 units of Aroma) for a semester (practically 13 weeks) under similar circumstances. The only difference between the groups was that the first group (the control group) received no test or quiz during the instructional period; the second group received a single mid-term examination; the participants of the third group were quizzed once a month (four quizzes altogether); the fourth group of participants were given a quiz every other week; and the participants of the fifth group were quizzed every week. The quizzes were short, and due to time limitations, they were designed in a way to require minimum time to answer. So, they did not bear any resemblance to the final exam.

To investigate the relationship between quizzes and class attendance, the roles were called every session and the participants' attendance was regularly checked. Then the total number of absences from each class was recorded and compared with those of other classes.

To answer the second research question (the effect of quizzes on increasing course performance), at the end of the instructional period, a 40-item achievement test was administered to all groups, and their means were compared. It needs to be clarified that the post-test was validated before being given to the target groups. The post-test and the afore-mentioned 'Michigan Language Proficiency Test' were given to a group of 30 subjects with similar characteristics to those of the target groups. The validity and reliability of the post-test turned out to be .81 and .87, respectively.

Having collected the data, to make computations and analyses easier, the number of participants in different groups was made equal by randomly removing two scores from group three and three scores from groups four and five.

Design

The present study employed an experimental design. To investigate the relationship between quizzes and class attendance of five groups of participants, the Chi-square procedure was used. To study the effect of quiz frequency on increasing course

performance, a balanced one-way ANOVA and a follow-up Scheffe test were employed to compare the performance of the same five groups.

Results

It was mentioned that to investigate the role of quizzes in increasing class attendance, the total number of absences from each class was recorded and compared with those of other classes. To make comparisons easier, the average of absences was calculated. The percentage of absences was also computed by dividing the total number of absences by the total number of possible absences (the number of subjects multiplied by the number of sessions) multiplied by 100. In addition to the total number of absences, the number of absences on quiz days was counted and the percentage of absences on quiz days was also computed. The outcome of the analyses is summarised in Table 1 in the Appendix.

A glance at the number and percentage of absences in each group indicates that the more frequently the quizzes are administered, the fewer absences are. Still, to check the statistical significance of the differences between groups with regard to the number of absences from class, a Chi-square procedure was used. The analysis of data revealed a Chi-square value of 65.71. The critical value of the Chi-square that was checked in the Chi-square distribution turned out to be 9.48.

In order to see the strength of association, the phi (Φ) was also estimated. The result was .23. Table 2 summarises the data needed for the analyses.

Since the χ^2 value is well above the critical value, the null hypothesis can be safely rejected. It can be concluded that there is a relationship between quiz frequency and class attendance.

Table 2

Data needed for the Chi-square procedure

No. of group	Quiz frequency	No. of absences observed	No. of absences expected	O - E	(O - E) ²	(O - E) ² /E
1	No quiz	84	57	27	729	12.78
2	Mid-tem	81	57	24	576	10.11
3	Monthly	69	57	12	144	2.52
4	Bi-weekly	38	57	- 19	361	6.33
5	Weekly	13	57	- 44	1936	33.97
Total		285	285		3746	65.71

$$\chi^2 = 65.71$$

$$\text{critical value} = 9.48$$

$$\Phi = .23$$

To investigate the effect of quiz frequency on course performance, the scores of the members of the five groups were tabulated and summarised, and the following data were obtained:

Table 3

Containing data on the course performance of the groups

Group	1	2	3	4	5
Quiz frequency	No quiz	Mid-term only	Monthly quizzes	Biweekly quizzes	Weekly quizzes
Grand total sum	403	459.5	517.5	568	588.5
Mean score	11.51	13.13	14.79	16.23	16.81
Standard deviation	3.25	2.76	2.72	2.46	1.93

Then, using a balanced one-way ANOVA procedure, the means of the groups were compared to see if there were any statistically significant differences between the means. Computations showed that the observed value for F was 14.44, indicating that the differences between the means were statistically quite significant at .05 level of significance. The data needed for the ANOVA procedure are summarised in table 4 in the appendix. Table 5 contains the results of the ANOVA procedure. As it can be

seen in the table, the strength of association for the balanced one-way ANOVA (ω^2) was estimated to be .23.

Table 5
The results of one-way ANOVA

Source of variation	SS	df	MS	F
Between groups	472.6	4	118.15	14.44
Within groups	1391.4	170	8.18	
Total	1864	174		
P ≤ .05 $\omega^2 = w^2 = .23$				

In order to locate the differences between the means, the Scheffe test was used to make ten post hoc comparisons of means. The results are summarised in Table 6:

Table 6
Scheffe test for differences of different quiz frequencies

group	Group 1 $\bar{x} = 11.51$	group 2 $\bar{x} = 13.13$	group 3 $\bar{x} = 14.75$	group 4 $\bar{x} = 16.23$	group 5 $\bar{x} = 16.81$
1		- 2.51	- 4.69*	- 7.04*	- 7.51*
2			- 1.66	- 4.62*	- 5.59*
3				- 1.44	- 3.01
4					- 0.58

P ≤ .05

$t_{\text{crit}} = 3.11$

The results of the one-way analysis of variance clearly indicate that the differences between the means are meaningful. This implies that quiz frequency influences course performance.

The Scheffe test table also reveals that the control group (no-quiz) subjects have performed worse than other groups (one exception being group 2). Members of group 4 and group 5 have also outperformed the subjects of group 2, confirming the claim

that the more frequent the quizzes are, the more effective they will be in improving the students' achievement scores.

Discussion

As it can be seen in Table 2, the weighted differences in the $(O - E)^2/E$ column are greatest for the weekly quizzes. The second greatest difference belongs to the no-quiz group.

It can be concluded that in the weekly-quizzes and biweekly-quizzes groups, the number of absences is fewer than expected, whereas in the other three groups, the number of absences is more than expected. It can be concluded, therefore, that the more frequently quizzes are administered, the more effective they will be in increasing class attendance.

The phi index also indicates that there is a relatively strong association between quiz frequency and class attendance in such a way that 23 percent of the time, class attendance can be accounted for by quiz frequency.

It can be concluded from the ANOVA procedure and the follow-up Scheffe test that quizzes significantly influence Iranian university students' achievement scores. The more frequently they are administered, the more effective they are in improving the course performance.

What all these boil down to is the conclusion that frequent quizzes positively affect both class attendance and course performance of Iranian university students.

The findings of the present study can have both theoretical and pedagogical implications. On the theoretical side, these findings may signify the importance of a paradigm shift from the present over-attention to teaching methods at the expense of testing methods towards some more testing or quiz-based strategies. Pedagogically, these results suggest that teachers will probably do better if they stop trying to do the 'learning' for the students and leave the task of learning to students. For this, of course, they need a pushing force to make students take responsibility. Quizzes may well be just what they need.

The Author

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Appendix

Table 1
Absences from each of the five groups

N of groups	Quiz frequency	Total no. of absences	Average of absences	% of absences	No. of absences on quizzes	No. of possible absences on quizzes	% of absences on quizzes
1	No quiz (control)	83	2.37	18.24	0	0	0
2	Mid-term only	81	2.31	17.80	3	35	8.75
3	Monthly quizzes	69	1.97	15.16	7	140	5.00
4	Biweekly quizzes	37	1.05	8.13	9	210	4.28
5	Weekly quizzes	13	0.37	2.58	10	385	2.59 *

* It needs to be explained that the subjects of group 5, who received weekly quizzes, received a total number of eleven quizzes. That's why the percentage of absences is different from the percentage of absences on quiz days. They didn't receive quiz in two sessions.

Table 4

Containing data necessary for the comparisons of means

S	G ₁		G ₂		G ₃		G ₄		G ₅	
	X	X ²	X	X ²	X	X ²	X	X ²	X	X ²
1	18.5	342.25	16.5	272.25	19	361	19	361	20	400
2	17	289	16.5	272.25	19	361	19	361	20	400
3	17	289	16	256	18.5	342.25	19	361	20	400
4	16	256	16	256	18.5	342.25	19	361	19	361
5	15	225	16	256	18	324	19	361	19	361
6	15	225	15.5	240.25	18	324	18.5	342.25	19	361
7	14	196	15.5	240.25	17.5	306.25	18.5	342.25	19	361
8	14	196	15	225	17.5	306.25	18	324	18.5	342.25
9	13.5	182.25	15	225	16	256	18	324	18	324
10	13	169	15	225	16	256	18	324	18	324
11	13	169	15	225	15.5	240.25	18	324	18	324
12	13	169	14.5	210.25	15.5	240.25	18	324	18	324
13	12.5	156.25	14.5	210.25	15.5	240.25	17	289	17.5	306.25
14	12.5	156.25	14	196	15.5	240.25	17	289	17.5	306.25
15	12.5	156.25	14	196	15	225	17	289	17	289
16	12	144	14	196	15	225	17	289	17	289
17	12	144	14	196	15	225	17	289	17	289
18	12	144	13.5	182.25	15	225	17	289	17	289
19	11.5	132.25	13.5	182.25	14.5	210.25	17	289	16.5	272.25
20	11	121	13	169	14.5	210.25	16.5	272.25	16.5	272.25
21	11	121	13	169	14.5	210.25	16	256	16.5	272.25
22	10	100	13	169	14.5	210.25	16	256	16.5	272.25
23	10	100	13	169	14	196	16	256	16	256
24	10	100	12.5	156.25	14	196	16	256	16	256
25	10	100	12.5	156.25	14	196	15.5	240.25	16	256
26	10	100	12	144	14	196	15.5	240.25	16	256
27	10	100	12	144	13.5	182.25	15	225	15.5	240.25
28	9	81	12	144	13.5	182.25	15	225	15.5	240.25
29	8	64	11.5	132.25	13	169	14	196	15	225
30	8	64	11	121	13	169	14	196	15	225
31	7	49	10	100	13	169	13.5	182.25	15	225
32	7	49	10	100	12	144	12	144	14	196
33	7	49	8	64	10	100	12	144	13	169
34	6	36	8	64	9	81	11	121	13	169
35	5	25	4	16	6.5	42.25	9	81	13	169
ΣX	403		459.5		517.5		568		588.5	
ΣX^2		4999.5		6279.75		7903.75		9423.5		10022.25