

Research Article

Comparing the Effectiveness of a Matching Quiz and Half-Minute Paper as Formative Assessment Tools

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Abstract. A range of research studies have been conducted on either quizzes or minute papers as formative assessment tools. A comparison of both tools was done by Kwan through his survey of students learning about the principles of economics. Kwan's study compared the application of a one-minute paper and quiz in the form of extended true-false, multiple-choice, and short answers. However, this article experimentally compared a matching quiz and half-minute paper as formative assessment tools in an Educational Research Design class, a content-based subject taught to university students. The results of the descriptive statistics showed that the matching quiz was more effective than the half-minute paper as a formative assessment tool. Inferential statistics using the independent sample t-test, however, revealed that the difference between the experimental and control groups' posttest mean scores was not statistically significant. This indicated that the matching quiz and half-minute paper could possibly be used interchangeably; however, the teacher should be aware that the matching quiz is more practical but cannot develop students' higher-order thinking skills, while the half-minute paper encourages active learning but takes more time to apply.

Keywords: effectiveness, matching quiz, half-minute paper, formative assessment

1. INTRODUCTION

This article discusses the results of quasi-experimental research that compares the effectiveness of matching quizzes and half-minute papers. The study is based on the fact that regular assessment is a crucial part of effective instruction. Through an assessment, teachers find out much more about students' prior knowledge, learning needs, and learning progress. In addition, it may increase the effectiveness of feedback they give to students. Among the four purposes of assessment (placement, diagnostic, formative, and summative), formative assessment is more important because it evaluates students while forming their competencies and skills to help them continue that process of growing. The essence of this formation is the instructor's teaching and learners'

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Published 22 March 2022

Publishing services provided by Knowledge E

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Selection and Peer-review under the responsibility of the 2nd-ELEHIC-2021 Conference Committee.



internalization of suitable feedback on a learning result while observing the next learning formation. Practically, the whole types of informal assessments belong to virtually formative. Their primary focus is the current development of the learners' competencies [1].

Formative assessment is a process that teachers and students use during a teaching-learning process and it provides feedback to adjust current instruction to improve students' achievement of expected instructional results [2]. It may be a planned process consisting of many assignments or tests in multi-levels [3]. Formative assessments are conducted periodically throughout different terms, such as instructional unit, course, semester, or year to check progress and serve feedback dealing with progress towards learning objectives. They aim at facilitating or forming learning. Formative assessments are an inseparable part of the ongoing process of learning for two reasons. First, they give data to students about the progress they are doing to achieve their objectives of learning so that they can plan what they should do next to advance their learning. Second, they give teachers information dealing with their advancement in carrying powerful instruction. Teachers can then think about what to do next to help students achieve their learning objectives. Results of formative assessments are not used to estimate the quality of either the students or the teacher; regular formative classroom assessment provides students with specific and frequent feedback that can be either diagnostic or prescriptive [2].

Brookhart (2010) states that formative assessment can be in the form of questioning, discussion, quizzes, assignment, homework, or observation of students' present work [4]. Quizzes, as one of the assessment tools, take place at different times during the course and they should be 'low stakes' (informal). Quizzes are also formative rather than summative, and their purpose is not to judge students in a 'pass/fail' or 'Yes/No' manner but to promote involvement in course content knowledge. A formative quiz can be done before classroom instruction. For example, a teacher can assign students to read as a preparation for a new lecture topic and set a quiz to lead their reading and help them assess their reading comprehension. On the other hand, a formative quiz may also happen after an instruction. For instance, to check things students have comprehended and what they can recall about the lesson, a teacher can set a quiz to help them (and the teacher) monitor comprehension and confusion. Therefore, the teacher can go on teaching the subject with improved sensitivity of how the students are handling. This way makes the instruction more informed and more responsive.

There have been many types of research dealing with quizzes and quizzing. Marcell in 2008, for example, researched the effectiveness of regular online quizzing to increase

students' preparation and class participation [5]. Moreover, Azorlosa in 2011 studied the effect of announced multiple-choice quizzes [6]. Zarei in 2015 researched the effectiveness of quizzing on L2 idioms learning [7]. Kayser in 2015 studied the effectiveness of daily quizzes towards student learning [8]. Refnita (2017) studied the effectiveness of matching quizzes in a class taught to the students of English as a Foreign Language [9].

Formative quizzes are an effective way for teachers to inform students about their learning improvement. They can let the students see if they master the lesson or if there is missing principles or misunderstanding that requires extra consideration. Moreover, formative quizzes may be selected to test memory and recall as well as basic reasoning. Teachers can arrange quizzes to grant students numerous efforts so they can test themselves and improve content. Brief quizzes during the class can also assist teachers to measure the success of their teaching and students' comprehension of the knowledge that has been informed. Concerning the idea, Roediger *et al* (2011) argue that students tend to study more regularly if they are quizzed frequently. Quizzes also let students discover missing parts in their recognition and focus learning attempts on the lesson that is hard to understand; moreover, if students learn after attending a quiz, they learn more lessons compared with taking no quiz. Quizzing also permits both students and teachers to do better metacognitive monitoring for it gives feedback about how well instruction is going. Better learning could happen in schools when students were quizzed more often in class and used self-testing as a study strategy [10]. A quiz is a small-scale or a brief test; as a result, test benefits are also known to be the benefits of a quiz. However, teachers need to be aware that quizzes are often done by employing tests which are objective type, like multiple choices, true-false, completion, or matching and these tests do not provide complete information about students understanding and performance [11].

Another formative assessment tool is minute paper which was made popular by Angelo and Cross [12]. Minute paper (or also called half-sheet response) is well known as a one-minute paper (OMP) because students are given one or two minutes to finish the task. It is naturally assigned before a class finishes and individual student is required to shortly write the answers to the following questions: (i) what was the ultimate crucial thing you just studied? and (ii) what question is unsolved? (see Stead, 2005: 119). Due to its briefness, Ashakiran and Deepthi (2013) define a one-minute paper as a very short, in-class writing activity, taking one minute or less to complete [11].

Furthermore, Stead (2005:119-220) considers OMP a useful tool of learning for teachers and students of multiple disciplines because it supports effective learning and it also provides quick feedback for the students and their instructor [13]. Ashakiran and

Deepthi (2013) consider OMP as a versatile assessment technique for instant and easy feedback since it provides current evaluation from the class and lets the teacher know whether students have known the key points of a lesson [11].

The ideas in the two paragraphs above suggest that OMP is a simple but versatile formative assessment. On the contrary, Kwan (2011) reminds us of the fact that although many teachers having used OMP get abundant benefits from this tool, they also report its shortcomings. First is the incentive problem: how can an instructor believe that students will turn in serious answers? And second, it may take more attempts than anticipated to produce open-ended but concise questions that can be rapidly understood and responded to [14]. Stead (2005), furthermore, says that despite positive responses towards the OMP, surveys on its practice in the classrooms of higher education in the UK and US tentatively reveal that it is not extensively employed in both countries. This lack of employment is caused by unfamiliarity with its essence and the assumption that it would take too much time to analyze the students' answers [13].

Due to the limitations of OMP, Angelo and Cross (1993) suggest teachers apply only a part of the OMP, either to ask students about what they know or to let them tell their doubts. This kind of OMP, called half-minute paper (HMP), is an adaptation that is most frequently used because it helps teachers do simpler and quicker assessment tasks [12]. Related to this suggestion, this current research limits the study to asking students to write the most important points they get from the lesson as the content of HMP.

Since there is a need for teachers to find a better assessment, a study that compares two or more types of assessment is certainly beneficial. Following this, this study compares the effectiveness of both quizzes and minute papers as formative assessment tools. An earlier comparison of quiz and minute paper was done by Kwan (2011). However, differences exist between Kwan's study and this study: (i) Kwan applied survey while this study applied quasi-experimental research, (ii) Kwan's study is qualitative while this study is quantitative, (iii) Kwan used OMP while this study used HMP, (iv) Kwan used extended true-false, multiple-choice, and short answer items in his quizzes while this study used matching items in the quizzes, and (v) Kwan applied both assessment tools in teaching Principles of Economics to the students of English as the first language while this study applied the tools in teaching Educational Research Design to the students of English as a Foreign Language (EFL).

2. METHODOLOGY

This study belongs to quasi-experimental research in which the independent variable is the formative assessment in the forms of matching quiz for the experimental group and HMP for the control group, while the dependent variable was the students' achievement on the Educational Research Design subject. The researcher chose a nonequivalent control group design, which means that two groups of the sample were pretested, given treatment in the form of different assessments, and post-tested at the end of the treatment [15, 16].

The population and sample of research are junior students of an English Department who were taking Educational Research Design subject. The researcher selected the sample by using the total sampling technique, and the number of samples in the experimental group is 25 students and in the control group is 21 students.

The classroom activities in both groups are similar, in which the students presented the key points and discussed them. The only difference lays in the form of formative assessment. The students in the experimental group answered a ten-items matching quiz during the last ten minutes while the students in the control group wrote every key point they could remember about the lesson. After a six-week treatment, a posttest was administered to both groups.

After two groups of data (data on pretest and data on posttest) were collected, they were quantitatively analyzed utilizing both descriptive and inferential statistics. Concerning the descriptive statistics, the researcher calculated the values of mean and standard deviation. Furthermore, to find a significant difference between post-test mean scores of both groups an inferential statistics was applied, and the *t*-test for an independent sample was chosen because there was no significant difference between the two pretest- mean scores.

3. RESULTS AND DISCUSSIONS

The results of data analysis using descriptive statistics on the pretest scores show that the experimental group's mean score is smaller than that of the control group, meaning that the student's ability in the experimental group is a bit lower than that in the control group before the treatment. The pretest data were then analyzed by using inferential statistics to know whether the mean difference between the two groups is statistically significant or not. It is important to do because the result would determine which kind of test should be applied to analyze the posttest scores later on. The result of data

TABLE 1: The Comparison of Groups Performance

Comparing Aspects	Experimental Group		Control Group	
	Pretest	Posttest	Pretest	Posttest
Lowest Score	2	8	3	6
Highest Score	18	91	14	79
Range	16	83	11	73
Mean	7.16	40.68	8.14	33.67
Standard Deviation	4.19	24.81	3.43	17.76
Mean of Gain Score	30.84		25.52	

analysis shows that the value of calculated t (-0.8386) is much smaller than the value of t table (2.0168) at the degree of freedom 44 and α .05, which means that the difference of pretest means between the two groups is not statistically different and the posttest scores of both groups can be analyzed by using the t -test for independent sample.

Furthermore, the data analysis using descriptive statistics towards the posttest scores reveals that there are differences between both groups in terms of range, mean, and mean of the gain score. The three of them show that the experimental group performed better than the control group in the posttest. The comparison between the two groups' performance is in Table 1.

These research findings derived from the result of data analysis using descriptive statistics affirm previous research results done by Refnita (2017), Zarei (2015), Kayser (2015), Thirey (2011), Azorlosa (2011), and Kwan (2011), and Marcell (2008) that giving quiz is a better way to improve students' achievement. In the previous studies, Refnita (2017) particularly found out that weekly matching quizzes had a significant effect on students' achievement in a content-based subject taught by using EFL [9]. Zarei (2015) found out that periodic quizzes significantly affected the comprehension and production of English idioms. The students' attitudes switched positively towards regular quizzes and their effect [7]. Kayser (2015) researched daily quizzes and found their effects on student learning. It was found that exposing students regularly to the material through the daily quizzes prevented the typical drop in retention. The study also revealed that frequent quizzes also assisted student success because they determined study focus; the students were helped to realize what has been understood and what needs to be reviewed. In addition, the instructor was also provided with an affluent insight into student comprehension, and he could see what topic to review and plan the schedule for the review afterward [8].

Other previous-relevant studies claimed as well that quizzes are better to be used in the learning programs. Thirey (2011), for example, examined the relation between

short quizzes that were administered at the beginning of each class period and the students' perceptions of how well they were prepared by quizzes. He found that there is a little positive relationship between daily quizzes and performance on the exam and taking quizzes over the previous day's material is the most chosen alternative for improving memory [17]. In addition, Azorlosa (2011) studied the effect of announced quizzes on exam performance. During the research, announced quizzes in the form of multiple choices were administered to a section of Psychology of Learning class during two consecutive fall semesters. The study showed that quizzes elevated students' attendance and the students had a positive impression of the quizzes as well as their impact on studying and exam preparation. Exam performance was also improved significantly in both semesters due to taking the quizzes [6]. Moreover, Kwan (2011) compared the effect of the one-minute paper and daily quiz. He found out that frequent quizzing significantly promoted learning; because of quizzes the students frequently study or review the lessons and they are less likely to cram for the tests. The quizzes also increase classroom attendance. Furthermore, it was also found that experience taking frequent quizzes lessens the anxiety factor among students, increases their feelings of competence and confidence, and finally makes their motivation to study and do well increased [14]. Furthermore, Marcell (2008) studied the effectiveness of regular online quizzing to increase students' participation and preparation. During three semesters, two sections of students who studied Introductory Psychology were compared. The first section took quizzes on daily readings, while the other section did not. The results of analyses showed that quizzing increased the number of student questions and comments at the start of class as well as the number of students reporting that they had read the assigned material before coming to class. A key value of online quizzing is in motivating students to keep a study schedule and a regular reading [5].

Further analysis on posttest scores through inferential statistics using the *t*-test for independent sample reveals that the value of calculated *t* (1.0589) is smaller than the value of *t* table (2.0168) at the degree of freedom 44 and α .05. It indicates that both groups' means are not statistically significant even though the mean of the experimental group is bigger than the mean of the control group. Analysis of the distribution of post-test scores suggests that students sitting in the experimental group are much superior in the first part of the post-test which was written in the form of matching items, a kind of objective test, while the students in the control group are benefitted by the second part of the test which was written in the form of open-ended items, a kind of subjective test. It affirms previous research results on OMP. Cited in Stead (2005), Almer *et al.* (1998) showed that there was a statistically significant correlation

between regular completion of OMP and performance on subsequent essay quizzes but there was no statistically significant difference was found for multiple-choice tests [13]. Moreover, McElroy and Coman (2002) also cited in Stead (2005) showed that OMP users were superior in tests that contained some subjective elements [13]. In summary, Almer's, McElroy & Coman's, and this research suggest that minute paper, either OMP or HMP, helps improve students' scores if the assessment contains subjective instead of objective tests.

4. CONCLUSION

Two specific points should be considered based on the findings of this study. Firstly, the results of data analysis using descriptive statistics telling that a matching quiz is more effective than a half-minute paper as a formative assessment tool implies that it is better to use a matching quiz as a formative assessment for content-based subjects, such as for Educational Research Design. Secondly, the inferential statistics using the *t*-test for the independent sample revealing that the experimental and control groups' post-test mean scores are not statistically significant may lead us to another conclusion that both matching quiz and half-minute paper are possibly used interchangeably as a formative assessment for content-based subjects. However, the teacher should be aware that a matching quiz is more practical but cannot develop students' higher-order thinking skills while a half-minute paper encourages active learning but it takes more time to apply.

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