

Effects of Using Rubrics on the Learning Achievement of Students in Educational Assessment and Evaluation

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Abstract

The quantitative study was designed to examine the learning achievement and the opinions of the freshmen students towards rubric usage in Educational Assessment and Evaluation module. The study was an experimental research and used two groups: pre-test-post-test design. The study was carried out in one of the colleges under the Royal University of Bhutan with 120 students from 4 sections of first year. Through cluster random sampling, 2 sections of students for the control group and the experimental group were selected out of 4 sections. Each section had 30 students. The students in the experimental group were taught using rubrics and the students in the control group were taught using a traditional method. Instruments such as achievement test and survey questionnaire were used to collect the data. The quantitative data collected from the achievement test and questionnaire were analyzed and interpreted using inferential statistics t-test with $p < 0.05$ level of significance, mean and standard deviation. The data analysis of test scores revealed that the overall mean for the post-test for the control group was 19.67 and for the experimental group was 25.4, which indicated that the learning achievement of the students who were taught using rubrics was higher than the students who were taught using a traditional method. The overall mean for survey questionnaire was 4.76 out of 5, which showed that students in the experimental group had positive opinions towards rubric usage in Educational Assessment and Evaluation. The findings showed that rubrics enhanced students' learning achievement and they had positive opinions towards rubric usage in Educational Assessment and Evaluation.

Key words: rubrics, educational assessment, evaluation

Introduction

In recent times, higher education has begun to shift from an emphasis on the traditional paradigm of testing knowledge and teacher-centered learning to a paradigm characterized by active, student-centered learning and thoughtful deliberative assessment (Howell, 2011). The shift from summative assessment to formative assessment has taken place in many developed countries and the scoring rubrics has emerged as a formative assessment model for teaching learning, and assessment (Mc Millan, 2013). A rubric is one of the tools to assist students as they engage in self-regulated learning process. Self-regulated learning is a student driven process in which a student reflects on the attributes of his or her own work, analyzes how well his or her work meets the stipulated criteria, and revises to meet the criteria. Wolf and Steven (2007) define rubric as a scoring tool used to evaluate students' performance in a

given outcome area based on a list of criteria describing the characteristics of products or performances at varying levels of accomplishment. The word 'rubric' is derived from the Latin word "Rubber", which means "Red". During the medieval period, rubric was a set of instructions attached to the law and was written in red (Renjit, Geroge, Renu, & Souza, 2015). Thus, a rubric is referred to something that is used to authoritatively guide people. A rubric divides the assigned work into separate components and provides clear description of characteristics of work associated with each component at varying levels of mastery. The criteria and the performance-level descriptions in a rubric help students understand what the desired performance is and what it looks like (Brookhart, 2013).

In a student-centered approach, a rubric could be shared with the students in order to support their learning (Jonsson, 2008; Jonsson & Svingby, 2007). Reddy and Andrade (2010) found that rubrics aren't just for grading. They can be used as teaching tools as well. When used by teacher as a part of formative assessment, rubrics can help students understand both the holistic nature and /or specific analytics of learning expected, level of learning expected, and then make decision about the current level of learning to inform revision and improvement. Rubrics are increasingly gaining recognition as valuable tools in teaching and learning in higher education (Bharuthram, 2015). Empirical evidences in rubrics studies show that using them can make both learning and assessment reliable (Jeong, 2015). Used widely in the USA at school level, rubrics are increasingly being accepted in higher education as well. Reddy and Andrade (2010) stated that research on the relationships between rubrics and self-regulatory behavior in students in higher education would be illuminating. Similarly, the use of a rubric as an assessment and formative evaluation tool, oriented toward learning and the acquisition of competence is spreading in universities along with learning-centered teaching model, largely promoted by the European Higher Education Area (Martinez-Figueira, Tellado-Gonzalez, & Raposo-Rivas, 2013).

Lecturers hardly use rubrics in teaching and learning. Some who use assessment criteria do not articulate what counts when they give grades which leadsto inconsistent assessment of student performance across modules. Seldom rubrics are provided to students and they are not involved in the development of rubrics. Therefore, they rarely address the qualitative issues of learners' progress. Lecturers often use lecture method which neither facilitates nor empowers learners' autonomous study-skills and lifelong learning skills(Trilling & Fadel, 2009). As a result, students lack initiative and problem-solving skills because they have not been trained to search for data by themselves (Samah, Jusoff, & Silong2009). They rely on lecturers to decide what, when and how to learn. Continuous spoon-feeding students in higher education perpetuates the issue of stifling their creative thinking and independent



learning.

Using rubrics as an instructional approach facilitates or empowers learners' autonomous study-skills which leads to lifelong learning. The learner-centered approach using rubrics encourages independent learning where learners are responsible for their own learning. The use of rubrics can be another skill for survival in 21st century where knowledge is abundant. The approach can further enhance learning by doing, critical thinking, analyzing power and organization. Rubrics improve students' quality of work through self-assessment and feedback. Rubrics also guide, monitor, facilitate and scaffold students while they are engaged in learning. Based on the advantages of rubrics discussed in his section, they can be regarded as the most appropriate method for teaching, learning and assessment of students. Since not many studies have been conducted on using rubrics in learning especially in Bhutan, this study was designed to examine learning achievement and opinions of first year students towards rubric usage in Educational Assessment and Evaluation module.

Materials and methods

A quantitative approach was used for the study. It was aimed to find out the learning achievement and opinions of first year students towards rubric usage in Educational Assessment and Evaluation. The data were collected through pre-test, post-test and survey questionnaire. The population of the study comprised of 120 students from 4 sections of first year students in one of the colleges under Royal University of Bhutan. The cluster random sampling was used to select 60 students from 2 sections out of 4 sections of first year students. One section was used as an experimental group and the other as a control group. Each section had 30 students. The two types of rubrics were analytical and holistic rubrics which were designed and used in the lesson to study the effects of using rubrics on the learning achievement of students. In the experimental group, the researcher introduced rubrics to the students and then taught how to use them to learn Educational Assessment and Evaluation concepts. The researcher provided students with rubrics along with the topic. Students learned the given topic using rubrics. The rubrics had the description of expected outcome of the given topic. They guided the students to achieve the expected learning outcomes. Teacher facilitated, monitored and scaffolded the students when they were learning the given topic using rubrics. Teacher made resources such as internet, textbooks and journals available to the students.

The control group was taught in a traditional way using a lecture method where teacher used power-point presentation, textbooks, and board to teach the students. Pre-test and post-test were conducted in both the control group and the ex-

perimental group to collect the data. Thirty multiple-choice questions were prepared from unit two of Educational Assessment and Evaluation course book. Twenty survey questionnaires using five-points Likert scale were prepared based on rubrics used in Educational Assessment and Evaluation and administered once to the experimental group to investigate their opinions towards rubric usage.

Comparative statistical analysis was done using paired sample t-test and independent sample t-test to analyze the data collected from pre-test and post-test. A comparative statistical analysis using paired sample t-test was done within the group. Comparison of pre-test and post-test scores of two groups was done by conducting independent t-test to assess and compare the learning achievement between the control group and the experimental group. The inferential statistics t-test with $p < 0.05$ level of significance, the mean and standard deviation were used to infer the results in this study. The total average mean and standard deviation were computed for questionnaires on students' opinions towards rubric usage and presented in the form of tables and figures.

Result

Result Analysis of Test Scores (Learning Achievement test)

1. Comparison of pre-test and post-test scores within the group (paired sample t-test)

Table 1

Comparison of pre-test and post-test scores within the group (the control group and the experimental group).

Group	Test	Mean	Mean Difference	Standard Deviation	Sig. (2 tailed)
Control	Pre-test	7.03	12.64	2.25	0.000*
	Post-test	19.67		2.76	
Experimental	Pre-test	7.10	18.30	2.43	0.000*
	Post-test	25.40		1.61	

* Significant ($P < 0.05$)

The comparison of pre-test and post-test scores within the group was done by comparing mean, standard deviation and significance value (p) as shown in Table 1. The mean of the pre-test and post-test of the control group were 7.03 and 19.67. The mean of pre-test and post-test of the experimental group were 7.10 and 25.40 respectively. The mean difference of pre-test and post-test of the control group



was 12.64 and the mean difference of pre-test and post-test of the experimental group was 18.30. The significance value (p) for both the group was 0.000 which is lower than 0.05 ($p < 0.05$). This means that there was a statistically significant rise in students' scores in the post-test when compared to the students' scores in the pre-test in both the control group and the experimental group.

2. Comparison of pre-test and post-test scores between the groups (Independent Sample t-test)

Table 2

Comparison of pre-test and post-test between the group (control and experimental groups).

Group	Test	Mean	Mean Difference	Standard Deviation	Sig. (2 tailed)
Pre-test	Control	7.03	0.07	2.25	0.91
	Experimental	7.10		2.43	
Post-test	Control	19.67	5.73	2.76	0.00*
	Experimental	25.40		1.61	

* Significant ($p < 0.05$)

Table 2 shows that the mean difference in the pre-test of the control and the experimental group was 0.07 and the two tailed significance value (p) was 0.91, which is higher than 0.05 ($p > 0.05$). This indicates that the test score in the pre-test for both the groups were not statistically significant. This shows that students in both groups had an equal learning ability before the treatment.

The mean difference of post-test between the control group and the experimental group was 5.73 and significant value (p) was 0.00 which was lower than the significant value $p < 0.05$. This indicates that there was a statistically significant difference in post-test scores between the control group and the experimental group. This shows that the test scores in the post-test for the experimental group were significantly higher than the test scores of the control group in the post-test. As expected by the researcher, students in the experimental group who were taught using rubrics performed better than the students in the control group who were taught using a traditional method.

Analysis of the Survey Questionnaire

Table 3

Illustration of the mean, standard deviation and students' level of opinions towards rubric usage in Educational Assessment and Evaluation.

Sl. No		Mean	Std. Deviation	Level of Opinion
A	Opinion on Interest			
1	Learning educational Assessment and Evaluation with rubrics is fun.	4.67	.498	Strongly Agree
2	I like the assessment tool-rubrics.	4.80	.407	Strongly Agree
3	I enjoyed learning Educational Assessment and Evaluation with rubrics.	4.87	.346	Strongly Agree
4	Rubrics make learning interesting.	4.77	.430	Strongly Agree
5	I like learning with rubrics.	4.87	.346	Strongly Agree
	Total	4.79	.405	Strongly Agree
B	Opinion on Guidance			
6	Rubrics guided me while learning.	4.73	.450	Strongly Agree
7	I became an independent learner with rubrics.	4.80	.407	Strongly Agree
8	I understood the Educational Assessment and Evaluation concept more clearly with the help of rubrics.	4.77	.430	Strongly Agree
9	I became more responsible for learning with rubrics.	4.73	.450	Strongly Agree
10	My performance improved after using the assessment tool-rubrics.	4.73	.450	Strongly Agree
	Total	4.75	.437	Strongly Agree
C	Opinion on Confidence			
11	I am confident in learning Educational Assessment and Evaluation concepts with rubrics.	4.63	.490	Strongly Agree
12	I learn better with rubrics.	4.87	.346	Strongly Agree



13	I get good grades in Educational Assessment and Evaluation when rubrics are used.	4.67	.479	Strongly Agree
14	I can perform better if there are rubrics.	4.77	.430	Strongly Agree
15	Learning Educational Assessment and Evaluation concepts are easier with rubrics.	4.67	.479	Strongly Agree
	Total	4.72	.445	Strongly Agree
D	Opinion on Feedback			
16	Feedback from my teacher improved my learning.	4.77	.430	Strongly Agree
17	Feedback were specific to the criteria used in the rubrics and very helpful.	4.77	.430	Strongly Agree
18	Feedback motivated me to learn more.	4.77	.430	Strongly Agree
19	Feedback improved my performance in Educational Assessment and Evaluation.	4.83	.379	Strongly Agree
20	Feedback were given immediately by teacher and helped us learn a lot.	4.70	.466	Strongly Agree
	Total	4.77	0.43	Strongly Agree
	Total Mean for all components	4.76	0.429	Strongly Agree

Source: (Choden, 2012, p.12; Mc Millan, 2013, p.61; Miller, Linn & Gronlund, 2009, p. 351; Garcia-Ros et al., 2012)

Level of opinion: 1-1.50 strongly disagree, 1.51-2.50 disagree, 2.51-3.50 undecided, 3.51-4.50 Agree, 4.51-5.00 strongly Agree.

The total mean for all components (interest, guidance, confidence and feedback) was 4.76 out of 5 as shown in Table 3. This indicates that the students' level of opinion towards rubrics usage in Educational Assessment and Evaluation falls in the (Strongly Agree) category on the Likert scale. This indicates that students in the experimental group had positive opinions towards rubric usage in Educational Assessment and Evaluation. The data analysis of students' opinion questionnaires also showed that majority of the students strongly agreed that rubrics used in Educational Assessment and Evaluation enhanced their interest, provided guidance and feedback, and boosted their level of confidence in learning Educational Assessment and Evaluation.

It is concluded that students had positive opinions towards rubric usage in Educational Assessment and Evaluation.

Discussion

a. Learning Achievement Test

The finding from the analysis of students' achievement tests showed that there was no significant difference in the mean score of the students in the control and the experimental group in the pre-test before giving the treatment. However, there was a significant difference in the mean score in the post-test for both the control and the experimental groups. The post-test mean score of the experimental group was significantly higher than the post-test mean score of the control group. This indicated that the students in the experimental group performed better than the students in the control group. The researcher concluded that rubrics used in Educational Assessment and Evaluation enhanced the learning achievement of students.

The findings of this study were consistent with Uddin's (2014) finding that rubrics has a significant impact on students' academic performance. The finding was also congruent with Jonsson (2014) and Howell's (2011) finding that rubrics contributed to a solid academic performance by playing a substantive role in positively impacting academic performance. It was also similar to Panadero and Jonsson's (2013) finding that rubrics has the potential to influence students' learning positively after analyzing 21 studies on rubrics. However, Pinto and Santos (2006) argued that an exclusive use of assessment rubrics may not help achieve effective learning outcomes and that there was a need to move beyond basic usage to a more innovative approach that guarantees students the experience of ownership. Egodawatte (2010) expressed that conducting training and guidance on the use of rubrics will help reduce the discrepancies, and intrinsically motivate students to use them for learning. Andrade (2001) had also shown that just providing a rubric to students was not consistently associated with better performance, and concluded that students must engage deeply with rubrics, perhaps by co-creating them and using them for self and peer assessments, as students did in the Reitmeier, Svendsen, and Vrchota's (2004) study.

The possible reasons to account for such significant gains in the test scores in the experimental group could be due to immense implication of rubrics on students' academic performance. Students used rubrics to support their own learning and academic performance. Using rubrics helped them to focus on their effort, produce work of high quality, earn better grades and felt less anxious about the given task (Andrade & Du, 2005). Another reason for the significant increase in the test scores



was due to shift in traditional paradigm of teacher centered teaching to a paradigm characterized by active and student-centered learning. Use of rubrics in the classroom had changed the role of teacher to a mentor and students as discoverers of their own new knowledge. The learner-centered approach using rubrics encouraged independent learning where learners were responsible for their own learning. The other reason for better performance by the experimental group was due to several learning theories associated with rubrics used in the module. Learning using rubrics was based on self-regulated learning theory, constructivism and behaviorism. Rubrics assisted the students in managing their thoughts, behavior, and emotion in order to successfully navigate their learning experience. Cheng and Huang (2014) also agreed that self-regulated learning had positive effect on students' academic performance. The integration of rubrics in Educational Assessment and Evaluation had also supported constructivist theory of learning where learners actively constructed their own knowledge using explicit criteria listed in rubrics. Other studies also supported that constructivist learning enhanced student's academic performance (Akanwa & Ovute, 2014; Qarareh, 2016). The feedback provided by rubrics is based on the Behaviorist theory of learning which believes that learners get motivated to learn when they receive positive feedback. The motivation fostered students' learning. This was supported by Gbollie and Keamu's (2017) finding that motivation had a significant impact on students' academic performance.

b. Survey Questionnaire

All statements under the four components of opinion were rated above 4.51 which falls in strongly agree category. This is because students found rubrics as a valuable tool in teaching and learning in higher education. Students' response to the statement 'I am confident in learning Educational Assessment and Evaluation concepts with rubrics' was rated the lowest from the 20 items. A possible reason could be time constraint because this study was carried out for only four weeks. Since students were using rubrics for the first time, it was not easy to gain confidence in a short period of time. However, the total mean for all the components (interest, guidance, confidence and feedback) was 4.76 out of 5 which falls in the (Strongly Agree) category on the Likert scale. This indicates that students in the experimental group had positive opinions towards rubric usage in Educational Assessment and Evaluation. This finding of the study was supported by Eshun and Poku (2013) who concluded that in terms of studio based learning, 86% of the students had a positive perception on the use of rubrics for they supported learning process but Andrade and Du (2005) reported that students not only had a positive perception towards rubrics but they also agreed that rubrics supported their academic performance in the contexts of

providing feedback, guidance and generation of interest. In Raposo-Rivas' (2016) study, almost one in three students (72.4%) was satisfied with the use of rubrics in their learning. Similarly, Kulprasit (2016) also found that students showed a positive attitude toward the writing rubrics when they were used as assessment for learning in English as Foreign Language (EFL).

The possible reasons for students' positive opinions towards rubrics usage could be because of learner autonomy, guidance and less anxious learning environment created by rubrics. Like in Moni and Moni's (2008) finding that the rubrics were strongly favored by students, majority of the students in the experimental group strongly agreed that rubrics used in Educational Assessment and Evaluation enhanced their interest, provided them guidance and feedback and they gained confidence while they were learning Educational Assessment and Evaluation concepts. Another reason why students had positive opinions towards rubrics could be because they understood their value. That's why they had rated all the statements above 4.51.

Conclusion

The data analysis of learning achievement test revealed that students in the experimental group who were taught using rubrics performed better than the students in the control group who were taught using a traditional method. The data analysis of survey questionnaire showed that students had positive opinions towards rubric usage in Educational Assessment and Evaluation. This finding indicated that students strongly agreed that rubrics used in Educational Assessment and Evaluation enhanced their interest, provided them guidance and feedback, and boosted their level of confidence in learning the module. The result of the study was also consistent with previous researches done on similar topics. The study concluded that rubrics enhanced students' learning achievement. Further students had positive opinions towards rubric usage in Educational Assessment and Evaluation. Therefore, rubrics had positive effects on students' learning achievement in Educational Assessment and Evaluation.

Implications and Recommendations

1. Since the study indicated that teaching Educational Assessment and Evaluation module using rubrics enhanced learning achievement and also students had positive opinion towards rubric usage, the Royal University of Bhutan lecturers may use rubrics as an instructional approach in other modules as well.
2. It is crucial that students take part in the creation of the rubric. Students' involvement in the development of rubrics may empower them to be more engaged



and active in their own learning. Collaborative creation of rubrics can hopefully address students' difficulties in understanding the expectations of the teacher which can result in improved learning outcomes (Marie, 2013).

3. The Royal University of Bhutan could train lecturers in using rubrics in teaching, learning and assessment.
4. Notion of rubric as an only assessment tool should be corrected among the lecturers and teachers.
5. Further research may be carried out to find the dimension of how the use of rubrics influences students' attitudes and self-regulation behaviours.

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