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Classroom Assessment Communication, Perceived Assessment Environment, and Academic Achievement: A Path Analysis

Hussain Alkharusi[1*]

[1]*Department of Psychology, College of Education, Sultan Qaboos University, P.O. Box 32 Al-Khod, P.C. 123, Oman.*

Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Aims: The current study aimed at examining how frequency of classroom assessment communication can make different types of perceived assessment environment salient and consequently affect academic achievement.
Study Design: The study employed a descriptive correlational research design.
Methodology: Sample: A multi-stage random sample of 4088 students nested within 236 classes was selected from the second cycle of the basic education grades from all governorates in the Sultanate of Oman. Instruments: Two questionnaires were used in this study. The first questionnaire was given to the students to assess perceptions of the classroom assessment environment. The second questionnaire was given to the teachers to assess the frequency of their practices related to classroom assessment communication. Data analysis: A path analysis was used to test the relationship between frequency of classroom assessment communication, perceived classroom assessment environment, and academic achievement.
Results: Although frequency of classroom assessment communication had no statistically significant direct effect on academic achievement, it had positive indirect effects on academic achievement through perceived classroom assessment environment.

**Corresponding author: E-mail: hussein393500@gmail.com;*

Conclusion: A positive perception of the classroom assessment environment requires more frequent communication with students about the classroom assessment.

Keywords: Classroom assessment; classroom environment; student perceptions; assessment communication; academic achievement.

1. INTRODUCTION

Classroom assessment communication represents one aspect of the classroom assessment environment [1]. It involves informing students of the learning expectations and providing them feedback about their attainment of the expectations. [2,3] described how classroom assessment environment can be differentiated into learning-oriented and performance-oriented environments based on students' perceptions. The perceived learning-oriented assessment environment involves asking students meaningful assessment tasks with moderate difficulty, giving them opportunities to improve their performance, and providing them informative assessment feedback. The perceived performance-oriented assessment environment involves asking students difficult and less meaningful assessment tasks with unattainable assessment standards and criteria, emphasizing the importance of grades more than learning, and comparing students' performances normatively. Research suggests that students in learning-oriented environments tend to focus on mastering and understanding of the learned materials whereas students in performance-oriented environments tend to use superficial learning strategies such as memorizing and rehearsing [4,5]. Several research studies have addressed how perceived classroom assessment environment influence academic achievement-related outcomes [3,4,6,7]. The present study builds on the previous research studies by examining how frequency of classroom assessment communication can make different types of perceived assessment environment salient and consequently affect the academic achievement.

Educators have long recognized the importance of classroom assessment communication for classroom instruction and student learning. It reflects the paradigm shift from assessment of learning to assessment for learning which is "part of everyday practice by students, teachers and peers that seeks, reflects upon and responds to information from dialogue, demonstration and observation in ways that enhance ongoing learning" [8,p. 264]. [9] noted that "An effective assessment process should involve a two-way communication system between teachers and their students." (p. 5). This communication system involves sharing ideas and clarifying understanding about the instructional objectives, assessment tasks, and performance. It provides diagnostic information about the instruction and assessment process to the teacher and descriptive feedback to the students about their task performance and areas for improvement in relation to the assessment standards. [10,11] contends that an effective assessment communication helps teachers to monitor students' understanding and to guide their instructional activities. [12] mentioned that students who participate in the classroom assessment process tend to feel a sense of ownership and responsibility for their learning. This kind of participation is likely to make them intrinsically motivating for learning [1].

Classroom assessment communication could be conceived of as a pedagogical strategy involving learning goal-guided dialogues between the teacher and the students linking instructional and assessment activities. It is grounded in the work of cognitive and social psychology. From the perspective of cognitive psychology, assessment communication allows for instructional scaffolding to occur through inviting students to participate in the assessment process and providing them examples, explanatory reasoning, and elaborations which support them in achieving the learning goals [11]. Language is the instrument of the classroom assessment communication, and as such it is an instrument for constructing knowledge and understanding. [13,14] argued that language does not only enable the individual to communicate, but also elaborate thoughtful processes. From the perspective of social psychology, assessment communication allows the student to engage in dialogic interactions with the teacher and other students in the classroom by asking questions about assessment tasks and standards and evaluating each other's work [11]. In these ways, classroom assessment communication would engage students in social participation and social cognition associated with processing information and understanding, and it is through these

cognitive and social activities by which students learn.

Although teachers are the focal point of the classroom assessment environment [15], an effective classroom assessment communication system invites students as partners in the assessment process by involving them in developing sample assessment tasks, defining criteria of assessment, and identifying strengths and weaknesses in their task performance [10]. As students exposed to the daily assessment activities in the classroom, they make out certain perceptions of the overall classroom assessment environment which in turn may influence their achievement-related behaviors [6,16]. These perceptions of the classroom assessment activities are often linked to the frequency of communication between the teacher and students about the assessment process [17]. Hence, in the present study, it is predicted that any effect of the frequency of classroom assessment communication on academic achievement would occur through students' perceptions of the assessment environment.

Based on [3] conceptualization of the perceived classroom assessment environment, two models would be tested in this study about the relationship between frequency of classroom assessment communication, perceived classroom assessment environment, and academic achievement. The first model is about the perceived learning-oriented assessment environment. The second model is about the perceived performance-oriented assessment environment. The main hypothesis tested in both models would be that perceived classroom assessment environment mediates the effect of the frequency of classroom assessment communication on academic achievement. Fig. 1 depicts the paths tests in the proposed models. The purpose of the present study is to determine how well this model fits the data from a sample of students in the second cycle of the basic education grades from all governorates in the Sultanate of Oman.

2. METHODOLOGY

2.1 Sample

A multi-stage random sample of 4088 students nested within 236 classes was selected from the second cycle of the basic education grades from all governorates in the Sultanate of Oman. Each class was taught by one teacher. The students in each class and their teacher are of the same gender. The number of participating students in each class ranged from 9 to 20 with an average of 17 students and a standard deviation of 3.66. Of all participating students, there were 2037 males and 2051 females. Of all participating teachers, there were 116 males and 120 females. The teaching experience of the participating teachers ranged from 1 to 30 with an average of 9 years and a standard deviation of 5.58.

2.2 Procedures

Permission was requested from the Ministry of Education and school principals to collect data from the students and the teachers during a regular class period one and a half month prior to the final school examinations. The participants were informed that a study is being conducted to examine students' perceptions of the classroom assessment environment in relation to the academic achievement and frequency of teacher's communication with students about classroom assessment. They were informed that they were not obligated to participate in the study, and if they wished to participate, their responses would remain confidential.

The teacher was asked to respond to a questionnaire about the frequency of their classroom practices related to assessment communication. The teacher responded to the questionnaire outside the classroom.

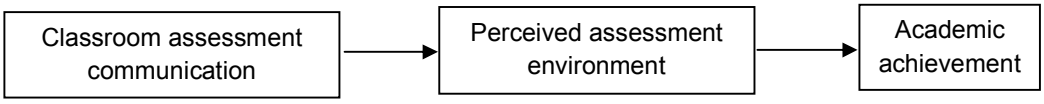

Fig. 1. A proposed path model of the frequency of classroom assessment communication, perceived classroom assessment environment, and academic achievement

The students were informed that their participation would not influence their grades or relations with the teacher of the subject being assessed. Students who wished to participate were asked to respond to a questionnaire about their perceptions of the classroom assessment environment related to the subject and teacher of the current class. They were also told to write their names to enable the author to match their responses with the grade received in the subject at the end of the semester. The final subject grades were obtained from the school administration. The students' questionnaires were linked to their respective teacher by a numeric code for purposes of analysis.

2.3 Instruments

Two questionnaires were used in this study. The first questionnaire was given to the students to assess perceptions of the classroom assessment environment. The second questionnaire was given to the teachers to assess the frequency of their practices related to classroom assessment communication. Both questionnaires were subjected to a content validation process done by a panel of three professors in the area of educational measurement and psychology at Sultan Qaboos University. They were asked to judge the clarity of wording and appropriateness of each item for the use with the targeted participants and its relevance to the constructs being measured. Their feedback was used for refinement of the items. Following is a description of the instruments.

2.3.1 Demographic information

Each questionnaire included a section about demographic information. The student questionnaire covered name and gender. The teacher questionnaire covered gender and teaching experience.

2.3.2 Perceived classroom assessment environment

This section of the student questionnaire included the 18-items Perceived Classroom Assessment Environment Scale developed by [3] to measure students' perceptions of the classroom assessment environment. As reported in [3], the items measured students' perceptions of the classroom assessment environment on two dimensions. The first dimension was learning-oriented assessment environment (9 items; Cronbach's α = .82). The second dimension was performance-oriented assessment environment (9 items; Cronbach's α = .75). Responses were obtained on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores reflecting greater agreement with the item.

As suggested by [18], student responses to each of the 18 items of the scale were aggregated to the class level. The result was a mean score for each class of the 18 items in the scale. A principal-axis factoring analysis with oblimin rotation was used to examine the factorial validity of the class-level data. Lending support to [3,18], the analysis yielded two factors as suggested by the eigenvalue rule and scree plot. Table 1 displays the factor loadings for the two-factor model of perceived classroom assessment environment at the class level. Together the two factors accounted for 37.85% of the total variance. All items loaded ≥ .30 on their primary factor. The first factor accounted for 28.42% of the variance (eigenvalue = 5.12) and consisted of nine items reflecting perceived "performance-oriented" classroom assessment environment as defined in [3,18]. The second factor accounted for 9.43% of the variance (eigenvalue = 1.70) and consisted of nine items reflecting perceived "learning-oriented" classroom assessment environment as defined in [3,18]. Measures of perceived performance-oriented and learning-oriented classroom assessment environment were constructed by averaging the items on each factor. Internal consistency coefficients for perceived performance-oriented and learning-oriented classroom assessment environment measures were .83 and .79 as indicated by Cronbach's alpha, respectively.

2.3.3 Frequency of classroom assessment communication

Informed by the literature [5], six items were used to measure teachers' frequent use of various assessment practices related to classroom assessment communication. Responses were obtained on a 5-point Likert scale ranging from 1 (never) to 5 (all of the time) with high scores reflecting more frequent use of the assessment described in the item. To examine factorial validity of the responses, a principal-axis factoring analysis was conducted on the six items to determine whether they represented a single construct. This analysis yielded a single factor with an eigenvalue of 1.39, and the unifactor solution accounted for 23.17% of the total variance. All items loaded higher than .30

on the factor. Table 2 presents the factor loadings for the classroom assessment communication items. An individual teacher's frequent use of the classroom assessment communication was represented by an average rating score across all the items. Internal consistency coefficient was .63 as measured by Cronbach's alpha.

2.4 Data Analysis

The current study aimed at testing two models about the relationship between frequency of classroom assessment communication, perceived classroom assessment environment, and academic achievement.

Table 1. Perceived classroom assessment environment items and their factor loadings

Items	Factor loadings	
	1	2
1. In this class, there is a mismatch between the learned subject materials and the assigned homework and tests.	.71	
2. In this class, the teacher gives more important to the grades than to the learning.	.69	
3. In this class, the teacher's grading system is not clear.	.67	
4. It is difficult to achieve high grades this class.	.59	
5. In this class, assessment tasks (e.g., the in-class and homework assignments) are not interesting.	.58	
6. In this class, students who do poorly are criticized in front of the whole class.	.58	
7. In this class, the teacher compares students' performances to each other.	.55	
8. The tests in this class are difficult to students.	.48	
9. In this class, the assessment results do not fairly reflect the effort put in studying the subject.	.36	
10. In this class, students receive continuous feedback from the teacher about their performance in the subject.		.75
11. In this class, the teacher helps students identify the places where they need more effort to improve their performance.		.72
12. In this class, the teacher uses a variety of ways (e.g., tests, reports, homework, activities, assignments, in class tasks …etc.) to assess students' mastery of the learned subject materials.		.60
13. In this class, students are given a chance to correct their mistakes in the assigned homework and tests.		.58
14. In this class, students can find out their strengths.		.54
15. In this class, assessment tasks (e.g., assignments and tests) encourage thinking and understanding more than just memorizing.		.47
16. In this class, the assigned homework and activities are related to the student's daily life.		.45
17. In this class, the teacher holds students the responsibility to learn.		.42
18. In this class, tests, reports and homework assignments are returned in a way that keeps individual student scores private.		.30

Note. Factor 1 = perceived performance-oriented classroom assessment environment. Factor 2 = perceived learning-oriented classroom assessment environment

Table 2. Classroom assessment communication items and their factor loadings

Items	Factor loadings
1. Communicating performance assessment criteria to students in advance.	.64
2. Providing oral feedback to each student about their performance.	.53
3. Providing written feedback for each student on their performance.	.45
4. Informing students of assessment objectives before applying it.	.44
5. Providing students with suggestions to enable them monitor their progress in learning.	.40
6. Communicating the method of grade distribution to students in advance.	.38

The first model was about the perceived learning-oriented assessment environment. The second model was about the perceived performance-oriented assessment environment. As depicted in Fig. 1, the main hypothesis tested in both models was that perceived classroom assessment environment mediates the effect of frequency of classroom assessment communication on academic achievement.

Each model was estimated using the covariance structure in EQS 6 for Windows [19]. It was evaluated by (a) goodness-of-fit statistics which assessed how well the model fits the data and (b) t tests of the path coefficients to determine whether each of the hypothesized relationships had been confirmed. In relation to the goodness-of-fit index values; the ratio χ^2/df should be less than or equal to 3, the Root Mean Square Error of Approximation (RMSEA) should be less than or equal to .08, the Nonnormed Fit Index (NNFI) that is also called the Tuker-Lewis Index (TLI) should be greater than or equal to .95, and the Comparative Fit Index (CFI) should be greater than or equal to .95 for an acceptable model fit [20]. Prior to the path analysis, the variables were screened for outliers and normality. There was no concern about deviation from normality. In addition, the means, standard deviations, and zero-order intercorrelations were computed for the variables.

3. RESULTS

Table 3 presents the means, standard deviations, and Pearson product-moment correlations of the study variables for all participants. As seen in Table 3, on average, the teachers reported communicating with students about classroom assessment most of the time. In addition, using paired samples t-test, the participating classes tended on average to be more oriented toward learning assessment environment than toward performance assessment environment; t(235)=25.04, p< .001. An examination of the zero-order correlations, shown in Table 3, there was no statistically significant direct relationship between frequency of classroom assessment communication and academic achievement. Consistent with previous research [3, 18], perceived learning-oriented and performance-oriented assessment environments were inversely related to each other, and each was significantly associated with academic achievement (learning-oriented positively and performance-oriented negatively).

Fig. 2 displays results of the path analysis models of the frequency of classroom assessment communication, perceived classroom assessment environment, and academic achievement. Both models displayed good fit to the observed data. With respect to the perceived learning-oriented assessment environment, results yielded an inferential test of χ^2 = 1.059 (p = .30, df = 1) with the following descriptive fit indices (RMSEA = .02 with 90%CI = [.00 -.18], NNFI = .99, and CFI = .99). As shown in Fig. 2, there was a statistically significant positive direct effect of the frequency of classroom assessment communication on perceived learning-oriented assessment environment ($\gamma = .18$, t = 2.73), indicating that classes having more communication about classroom assessment are likely to make salient the possibility of a perceived learning-oriented assessment environment.

Also, there was a statistically significant positive direct effect of perceived learning-oriented assessment environment on academic achievement ($\gamma = .27$, t = 4.27), indicating that classroom assessment environments with a strong emphasis on learning and understanding tend to foster high levels of academic achievement.

Table 3. Means, standard deviations, and intercorrelations for the study variables (N = 236)

Variables	ACHV	LOAE	POAE	*M*	*SD*
ACHV	-			3.16	.69
LOAE	.27***	-		3.67	.30
POAE	-.44***	-.40***	-	2.76	.37
ACOM	.11	.18**	-..23**	4.01	.55

Note. ACHV = academic achievement. LOAE = learning-oriented classroom assessment environment. POAE = performance-oriented classroom assessment environment. ACOM = assessment communication.
***p < .01; ***p < .001*

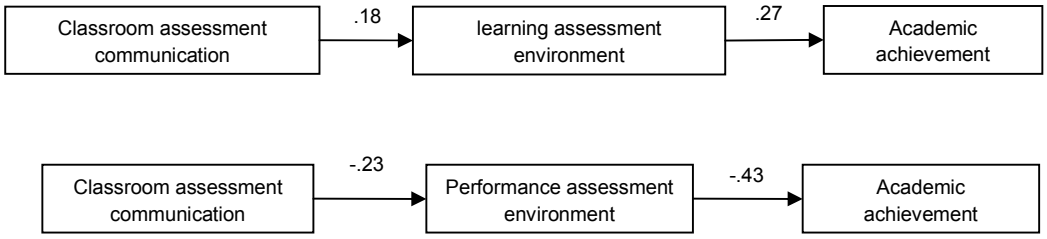

Fig. 2. The estimated path models of the frequency of classroom assessment communication, perceived classroom assessment environment, and academic achievement

The frequency of classroom assessment communication had an indirect positive effect on academic achievement through perceived learning-oriented classroom assessment environment (.18 × .27 = .05), suggesting that more classroom assessment communication is likely to make salient the possibility of a perceived learning-oriented assessment environment which should lead to an increased academic achievement. Overall the model accounted for 7.3% of the variance in academic achievement.

With respect to the perceived performance-oriented assessment environment, results yielded an inferential test of χ^2 = .0063 (*p* = .063, *df* = 1) with the following descriptive fit indices (RMSEA = .00 with 90%CI = [.00 -.11], NNFI = .99, and CFI = .99). As shown in Fig. 2, there was a statistically significant negative direct effect of the frequency of classroom assessment communication on perceived performance-oriented assessment environment ($\gamma = -.23$, t = 3.52), indicating that classes having less communication about classroom assessment are likely to make salient the possibility of a perceived performance-oriented assessment environment. Also, there was a statistically significant negative direct effect of perceived performance-oriented assessment environment on academic achievement ($\gamma = -.43$, t = 7.27), indicating that classroom assessment environments with a strong emphasis on harsh grading and comparative evaluation practices tend to discourage high levels of academic achievement. The frequency of classroom assessment communication had an indirect positive effect on academic achievement through perceived performance-oriented classroom assessment environment (-.23 × -.43 = 1), which was higher than the indirect effect through perceive learning-oriented assessment environment. Overall the model accounted for 18.6% of the variance in academic achievement.

4. DISCUSSION AND CONCLUSION

Classroom assessment communication represents one aspect of the classroom assessment environment [1]. Educators have stressed the importance of inviting students as partners in the classroom assessment environment through the development of an effective classroom assessment communication system [9,10,21]. An effective communication between the teacher and students about classroom assessment process is likely to lead to a positive classroom environment conducive to enhancing student learning [21]. Two types of the classroom assessment environment have been identified in the literature based on the perceptions of students: learning-oriented and performance-oriented [3]. The current study aimed at examining how frequency of classroom assessment communication can make different types of perceived assessment environment salient and consequently affect student academic achievement.

The results clearly demonstrated that the positive impact of the frequency of classroom assessment communication on academic achievement was indirect. Specifically, the frequency of the classroom assessment communication influenced the perceived classroom assessment environment which in turn directly influenced academic achievement. These results point to a conclusion that the frequency to which the teacher communicates with students about the type of assessment tasks, the nature of assessment standards and criteria, and their performance on the assessment tasks might affect students' perceptions of the classroom

assessment environment which in turn might affect student academic achievement. Thus, a positive perception of the classroom assessment environment requires more frequent communication with students about the assessment process.

These results add support to the theoretical perspectives that the teacher makes up the classroom assessment environment within which students' perceptions play a role in influencing their academic achievement [1]. Also, the results of the present study confirm the cognitive mediation model of motivation, which suggests that students' perceptions mediate the effect of teacher's practices [22]. In addition, according to the organizational evaluation theory articulated by [23], giving students a role in developing assessment standards and criteria and in assessing their own and others' work might positively elevate students' perceptions of the classroom assessment environment and strengthen students' sense of controllability which is conducive to enhancing academic achievement. Furthermore, based on the cognitive evaluation theory outlined by [24], the nature of the classroom assessment communication created by the teacher might elicit different students' perceptions and result in qualitatively different motivational patterns. For example, teacher's communication with students that is informational and non-judgmental is likely to lead to a perception of competence that is associated with increased academic achievement. Finally, [23] pointed out that classroom assessment communication should be relatively frequent to foster student effort and achievement.

The connections between the frequency of the classroom assessment communication, perceived classroom assessment environment, and academic achievement have research implications as well as classroom practice implications. Future research on classroom assessment might explore the effects of classroom assessment communication on other cognitive and motivational outcomes. [25] noted that classroom assessment communication involves sharing ownership of assessment between the teacher and students which in turn draws together a wide range of motivation-related variables such as metacognition, interest, attribution theory, and self-regulated learning. All these variables are associated to positive achievement activities. With respect to classroom practice, the results imply that students can be empowered to take control of their own learning by a variety of practices. Teachers can engage students more frequently in planning of assessment tasks guided by the learning goals, developing assessment tasks, setting up standards and criteria for scoring, and assessing their own and others' work in relation to the assessment standards and criteria. Also, students should be given frequent informational feedback about their performance in both oral and written formats.

The generalizability of this study results may be limited by the use of self-report questionnaire. It is possible that classroom assessment process might be confounded with other variables. Hence, it is important for future research to investigate the robustness of these findings by utilizing multiple data collection methods including classroom observations and interviews with students and teachers. Finally the analyses in this study were correlational in nature and as such they do not allow definitive causal statements to made with regard to the observed relationships. More research is needed to testify and replicate the findings in other contexts.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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