Omani Science Teachers' Perceptions of the Difficulties In Using Creative Teaching Methods

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This study aims at investigating the perceptions of science teachers in Omani Basic Education schools regarding the difficulties they face in using creative teaching methods in the classrooms. The sample comprised 130 science teachers of basic education schools in the governorates of Muscat and the Interior. For the purpose of the study a 42-item questionnaire covering five domains – teacher, student, subject, school administration and other difficulties – was developed and administered by the researcher. The validity of the questionnaire was checked by a panel of experts and practitioners in science: Cronbach alpha reliability coefficient was found to be 0.923. Results revealed that the main difficulties that teachers encounter when using creative teaching methods are: exclusion of topics that may promote creativity from textbook content, inadequate pre- and in-service training, discouraging teachers thinking creatively, teachers' weak intrinsic motivation, their heavy workload, and the absence of a free academic atmosphere. The results also show no significant differences between teacher's perceptions of the difficulties in using creative teaching methods with respect to gender or the school district. A few recommendations have been proposed based on the findings.

Keyword: Science teacher, Creative teaching, Teaching difficulties, Oman.

إدراك معلمي العلوم في سلطنة عُمان لصعوبات استخدام طرق تدريس إبداعية

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تهدف هذه الدراسة إلى التعرف على صعوبات التدريس الإبداعي التي تواجه معلمي العلوم في مرحلة التعليم الأساسي بسلطنة عُمان. تكوّنت عينة الدراسة من ١٣٠ معلماً ومعلمة من معلمي العلوم بمحافظة مسقط والمنطقة الداخلية بسلطنة عُمان. ولأغراض الدراسة قام الباحث ببناء استبانة تألفت من ٤٢ عبارة توزّعت على خمسة مجالات هي: المعلّم، والطالب، والمادة العلمية، وإدارة المدرسة، وصعوبات أخرى. وقد تم التحقق من صدق الأداة بعرضها على مجموعة من المحكمين المتخصصين، أما ثباتها فقد استخدم الباحث معامل ألفا كرونباخ، وقد ظهر أن معامل الثبات الكلي للأداة هو (٠,٩٢٣)، وبينت النتائج أن أبرز الصعوبات التي تحول دون التدريس الإبداعي هي: عدم تضمين محتوى الكتاب المدرسي موضوعات تشجع الإبداع، و ضعف الإعداد والتدريب للمعلمين، وعدم تشجيع المعلمين على التفكير الإبداعي، وضعف الدوافع الداخلية للمعلم وكثرة أعبائه الوظيفية، وغياب جو الحرية الأكاديمية. كما بينت النتائج أيضا عدم وجود فروق دالة إحصائيا في تقدير المعلمين لصعوبات التدريس الإبداعي تعزى لمتغيري الجنس والمنطقة التعليمية. وفي ضوء هذه النتائج قام الباحث بعرض عدد من التوصيات والمقترحات.

الكلمات المفتاحية: معلم العلوم، التدريس الإبداعي، صعوبات التدريس، سلطنة عمان.

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INTRODUCTION

Creativity is defined as the phenomenon whereby something new is created which has some kind of value. It is also defined as the act of turning new and imaginative ideas into reality. It involves two processes: thinking and producing. The production or implementation of a creative idea results in innovation. If one has an idea, but does not act upon it, he is considered imaginative, but not creative (Naiman, 2010). Creativity, more than before, is of interest to researchers in economics, politics and pedagogy. Sawyer (2006) affirms the role of creativity in economic innovation and in a popular theory of creative classes. According to psychology and pedagogy, there are different degrees or levels of creativity.

One of the main aims of secondary education is the development of critical and creative thinking. This can be achieved through the stimulation of students' in-depth learning and through creative teaching. Creative teaching is a high-risk strategy that requires teachers' self-confidence and an investment of time and energy (Davies, 2004). Creative teachers have been described as "planning geniuses, innovators and experimenters" (Reppa, 2010). Halliwell (1993) assures that creative teaching is not about being extraordinary or 'dazzling', but suggests that it should include four qualities: a clear sense of need, the ability to read the situation, the willingness to take risks, and the ability to monitor and evaluate events.

Science is recognized as one of the important areas of human activity for developing creativity (American Association for the Advancement of Science AAAS, 2006). McCormack and Yager (1989) proposed taxonomy of science education, which included an "imagining and creating" domain. Adopting his taxonomy, Gilbert (1992) suggested six kinds of questioning for teaching creativity: association, imagination, brainstorming, organization, analogy and metaphor as well as reconceptualization. A review of science education literature on current approaches to creativity in school science can be categorized into four practices: creative teaching, art and science, inquiry science and the nature of science (Kind and Kind, 2007). Although the literature (National Advisory Committee on Creative and Cultural Education NACCCE, 1999) makes a clear distinction between 'teaching for creativity' (associated with children's creative development) and 'teaching creatively' (associated with teacher attributes), the two are closely related. "Teaching for creativity involves teaching creatively…to put it in another way, teachers cannot develop the creative abilities of their pupils if their own creative abilities are suppressed" (NACCCE 1999, p. 90).

The bulk of research studies focused on creativity in the field of science education emerged in recent years. Cheng (2004) presented a comprehensive set of strategies for developing physics learning activities to foster student creativity. Hu and Adey (2002) suggested a scientific creativity model, which included questioning, problem solving, divergent thinking and other thinking elements in scientific imagination, investigations and inventions. Cheng (2006) also proposed a comprehensive model for infusing elements of creativity into the school physics curriculum.

In a recent review, Kind and Kind (2007) found that there are different approaches of fostering creativity in science education, including open inquiry, creative problem solving, creative writing, and metaphors and analogies. Dineen and Nui (2008) tested the efficacy of U.K. creative teaching approaches in the Chinese educational context, where a creative pedagogic model developed in the U.K. was used to deliver the Chinese curriculum. The study revealed that the creative methods developed in the U.K. were highly effective in encouraging learner creativity and related attributes such as intrinsic motivation, enjoyment and confidence. Reppa (2010) declared that both a creative program and a regular one were enjoyable. It is only the teachers' characteristics that affect the type of enjoyment.

Oman Education Master Plan places emphasis on the importance of both thinking and creativity; one of the goals of education is to arm students with creative and critical thinking abilities (Educational Portal, 2010). The designing of science curricula should not rely only on a single learning and teaching strategy, but on various strategies that address all-round skills, focus on thinking skills, cognitive, psychomotor and affective development. Accordingly, creative and critical thinking teaching and learning strategies have been implemented in Omani schools. Besides the importance accorded to creativity in the educational plan, the teacher's guide that is up-

graded continuously contributes tremendously in enhancing teaching in creative ways. Teaching and learning technology is considered one of the most important factors that contribute to achieving effective learning using appropriate and effective teaching aids along with appropriate educational strategies and policies.

Rationale and statement of the problem

The literature shows that matching teaching style with learning and thinking styles increases academic achievement and makes the teaching and learning process an enjoyable experience. However, without knowing teachers' teaching styles, it is difficult to determine the efficacy of the current teaching strategies and the best way of accommodating students' learning and thinking styles.

From his experience of teaching and supervising at the Faculty of Education at Sultan Qaboos University, the researcher has observed that many teachers consider the task of developing the capacity of students to think creatively as a vital educational aim that is placed in the forefront of their priorities. However, when it comes to implementation, this goal does not match reality, because the education system does not provide sufficient room for thinking and creativity. All of this points to a dire need to investigate the issue of creativity in teaching science in the Omani context. Therefore, this study attempts to identify the difficulties Omani science teachers encounter when attempting to teach creatively. The research questions raised in this study are:

1. What are the difficulties in using creative teaching as perceived by basic education science teachers?
2. Are there any significant differences in the difficulties teachers face in using creative teaching methods attributed to teachers' gender and the school district?

METHOD

Population and sampling

The study population consisted of all teachers enrolled in the General Directorate of Education in Muscat and the Interior in the year 2009/2010, from which 27 teachers were randomly selected to verify the reliability of the study tool and were excluded from the study sample. The study sample was (130) teachers, including (71) male teachers and (59) females, as shown in the Table below. They all have been randomly selected taking into account the representation of gender and schools district.

Table 1

Description of the Study Sample

Feature	Sample Distribution		Total
Gender	Male	Female	
	71	59	130
District	Muscat	Interior	
	78	52	130

This sample represents about 10% of the population in the two regions. The largest number of schools was found to be centered in two districts, namely Muscat and the Interior. After selecting the two geographical districts, the researcher has randomly selected 15 schools taking into account teacher gender and the school location. The reason behind selecting this sample also was due to feasibility reasons. The researcher visited some of the schools himself and distributed the instrument among teachers.

Instrument

To determine the difficulties that teachers face in creative teaching, a questionnaire was designed consisting of 42 items, covering 5 domains, as follows:

1. The first domain: constraints related to the learner (items 1-7).
2. The second domain: constraints related to the subject (items 8-17).
3. The third domain: constraints related to the teacher (items 18-26).
4. The fourth domain: constraints related to the school administration (items 27-33).
5. The fifth domain: Other constraints, (items 34-42).

Tale 2

Reliability Coefficients for The Instrument Domains

	Difficulties related to the Domain					*Overall*
	Learner	Teacher	Admin	Subject	Others	
Alpha Coefficient	0.686	0.811	0.809	0.743	0.854	0.923

Validity and reliability

The instrument was given to a panel of experts and practitioners from the Curriculum and Psychology Departments at Sultan Qaboos University and the Ministry of Education prior to its piloting to establish the validity of the items. It was amended according to their suggestions. The instrument reliability factor was calculated using the internal consistency Cronbach alpha and was found to be 0.923. The reliability coefficients for the five domains are presented in Table 2.

Table 2 shows high reliability coefficients for the study instrument and its domains, indicating the strength of the link between items with the domains and with the test as a whole. To determine the level of difficulty, a 4-point Likert scale was used for the respondents to indicate their opinions on the items, as follows: *large*, *medium*, *weak* and *non-existent*. A score was given for each of the four options: *large* (4), *medium* (3), *weak* (2), *non-existent* (1).

Limitations

The study was limited to determining the difficulties of creative teaching as perceived by the basic education science teachers. The instrument was administered to a sample of teachers enrolled at the Directorate General of Education in Muscat Governorate and the General Directorate of Education in the region of the Interior, during the second semester (Spring 2010).

RESULTS AND DISCUSSION

To answer the study questions, the researcher calculates frequencies, means, standard deviations, and percentages of the sample responses. The final level of obscurity based on the mean value given by the respondents according to specified criteria. These criteria were extracted in base of representing three quarter (0.75) from the score given for each choice of the four options in the instrument.

Degree of Obscurity	Criterion
Large	the value of the mean (3.26-4.0)
Medium	the value of the mean (2.51-3.25)
Weak	the value of the mean (1.76-2.50)
Non-existent	the value of the mean (1.00-1.75)

Question 1: What are the difficulties in creative teaching as perceived by basic education science teachers?

Tables 3, 4, 5, 6 and 7 show the means and percentages of the responses to the items of the instrument domains ranked according to the means.

Table 3
Percentages, Means and Intensity of the Difficulties Related to the Learner

No	Item	% of Difficulty Intensity Degree				Mean	Difficulty rank		Intensity
		High	Moderate	Weak	Not Exist		Domain	Total	
5	Students' abilities and aptitudes does not match their ability to think creatively	61.5	10.8	16.9	10.8	3.2	1	13	Moderate
3	Difficulty to involve students with creative teaching methods	52.3	12.3	19.2	16.2	3.0	2	22	Moderate
2	Difficult student motivation to participate creatively	51.5	9.3	20.0	19.2	2.9	3	23	Moderate
7	Subject difficulty hinders students' creative thinking	50.8	9.2	21.5	18.5	2.9	4	25	Moderate
1	The large number of students per class	49.6	8.5	24.6	20	2.8	5	32	Moderate
4	Students prefer the traditional teaching ways rather creative ways	54.6	12.3	16.9	16.2	2.8	6	38	Moderate
6	The absence of social harmony among some students	16.9	13.1	27.7	42.3	2.1	7	39	Weak

Table 4
Percentages, Means and Intensity of the Difficulties Related the to Teacher

No	Item	% of Difficulty Intensity Degree				Mean	Difficulty rank		Intensity
		High	Moderate	Weak	Not Exist		Domain	Total	
20	Insufficient teacher's knowledge in creative teaching methods	75.4	4.6	12.	7.7	3.5	1	5	Large
23	The teacher is not able to update his/her knowledge about creativity	75.4	4.6	12.	7.7	3.5	2	6	Large

Table 4
Percentages, Means and Intensity of the Difficulties Related the to Teacher

No	Item	% of Difficulty Intensity Degree				Mean	Difficulty rank		Intensity
		High	Moderate	Weak	Not Exist		Domain	Total	
	in their areas								
18	Inadequate pre-service training in creativity	76.9	3.1	6.2	13.9	3.4	4	12	Large
22	Inadequate in-service teacher training in the area of creativity	76.9	3.1	6.2	13.8	3.4	3	7	Large
19	Large teaching and administrative obligations on the teacher	78.5	4.6	7.7	9.2	3.4	5	9	Large
21	Prevailing theoretical teaching methods	57.7	11.5	10.8	20.0	3.1	6	19	Moderate
25	Teachers' fear of failure in using creative teaching methods	49.2	8.5	22.3	20.0	2.9	7	32	Moderate
24	Lack of teachers' internal motivation	46.2	10.0	23.8	20.0	2.8	8	33	Moderate
26	Difficulty in classroom management when using creative teaching methods	46.9	8.5	23.1	21.5	2.8	9	35	Moderate

Table 5
Percentages, Means and Intensity of the Difficulties Related to the Subject

No	Item	% of Difficulty Intensity Degree				Mean	Difficulty rank		Intensity
		High	Moderate	Weak	Not Exist		Domain	Total	
11	Paucity of enriching activities based on the teaching methods developing creativity	82.3	5.4	8.5	3.85	3.66	1	1	Large
9	Weak contribution of the subject in developing student's creative thinking	84.6	13.9	1.5	0	3.60	2	2	Large
12	Absence of rare availability of examples or cases to raise students' creativity	78.5	6.1	12.3	3.1	3.60	2	2	Large
17	Inappropriateness of subject topics incorporated in the course	63.1	11.5	16.2	9.2	3.28	4	12	Large
15	Topics presentation in the textbooks demotes students' interest	60.8	10.0	14.6	14.6	3.17	5	15	Moderate
8	Length of the course and high congestion of information	55.4	13.1	16.9	14.6	3.09	6	18	Moderate
14	Inappropriateness of the course topics to allocated quota of lessons	55.4	11.5	14.6	18.5	3.04	7	21	Moderate
10	Weak subject topics sequence and absence of individual differences consideration	49.2	10.0	22.3	18.5	2.90	8	29	Moderate
13	Subject is unrelated to the students' environment	49.2	10.0	22.3	18.5	2.90	8	29	Moderate
16	There may be some typos and technical mistakes in the textbooks	26.2	16.2	22.3	35.3	2.33	10	39	Weak

Table 6
Percentages, Means and Intensity of the Difficulties Related to School Administration

No	Item	% of Difficulty Intensity Degree				Mean	Difficulty rank		Intensity
		High	Moderate	Weak	Not Exist		Domain	Total	
27	School negative position towards using creative activities in teaching	70.8	12.3	7.69	9.23	3.37	1	10	Large
28	Educational environment imposed by the school does not support innovation	73.1	8.46	10.0	8.46	3.31	2	11	Large
30	Teachers are not given opportunity to express their creative ideas	60.8	11.5	15.4	12.3	3.21	3	14	Moderate
31	Schools principals have no role in unleashing teachers creativity	60.8	10.0	13.8	15.4	3.16	4	16	Moderate
33	Negative school administration practices on teachers	50.8	9.2	21.5	18.5	2.92	5	25	Moderate
32	Control of the school administration on the creativity-related activities of	46.9	8.5	23.1	21.5	2.81	6	35	Moderate

No	Item	% of Difficulty Intensity Degree				Mean	Difficulty rank		Intensity
		High	Moderate	Weak	Not Exist		Domain	Total	
29	students inside and outside school Lesson distribution in the school timetable does not promote creativity'	46.9	7.7	23.9	21.5	2.80	7	38	Moderate

Table 7
Percentages, Means and Intensity of the Difficulties Related to Other Areas

No	Item	% of Difficulty Intensity Degree				Mean	Difficulty rank		Intensity
		High	Moderate	Weak	Not Exist		Domain	Total	
38	Lack of community interest for the creative teachers	67.7	16.2	10.8	5.3	3.46	1	3	Large
37	Weakening of the supervisors in promoting the creative capacity in teachers	60.7	10.0	13.9	15.4	3.16	2	16	Moderate
36	Evaluation methods measure lower cognitive levels such as knowledge acquisition demoting creative thinking skills	57.7	11.5	10.8	20.0	3.07	3	19	Moderate
39	Lack of the necessary resources to conduct creative activities	51.5	9.23	20	19.2	2.93	4	23	Moderate
35	Lack of resources developing students creative capabilities	50.8	9.23	21.5	18.5	2.92	5	25	Moderate
34	Teachers are instructed to finish specific syllabus throughout a given semester	55.4	11.5	14.6	18.5	2.91	6	28	Moderate
40	Uncertainty and weakness in the classroom enrichment activities	49.2	10.0	22.3	18.5	2.90	7	29	Moderate
42	Low educational level of parents and domestic instability	16.9	13.1	27.7	42.3	2.05	8	39	Weak
41	The existence of the school building in crowded areas, where the noise is doubled	10.8	8.46	31.5	49.2	1.81	9	41	Weak

In order to recapitulate results in domains, Table 8 provides the rank order of domains based on the domain means.

Table 8
Means of Difficulty Intensity and Ranking of the Instrument Domains

Domain	Average Mean	Intensity	Difficulty Rank
Teacher	3.20		1
Subject	3.18		2
School Administration	3.08	Moderate	3
Learner	2.82		4
Others	2.80		5

As shown in Table 8, difficulties in creative teaching were ranked from most to least difficult in the following order: teacher (M= 3.20), subject (M = 3.18), school administration (M = 3.08), learner (M = 2.82) and others (M = 2.80). Tables (3-8) reveal the following significant results:

- The items mean responses range between 3.66 (the highest) and 1.81 (the lowest).
- The study sample indicated difficulties in all items ranging from vulnerable and large degree of obscurity. While 26 items show moderate difficulty, 4 items indicate weak difficulty, where there are 12 items that affirm great difficulty hindering creative teaching.
- Difficulties preventing creative teaching are mainly in the domains related to the teacher and subject, but not related to the learner. This shows that teaching is mainly serious in domains teacher, subject and school administration, and is trivial when related to the learner. This affirms that the students are able to study creatively if other difficulties are sorted out such as enhancing creative activities in textbook content, reducing teachers' load and pro-

moting creative teaching in schools (Kind and Kind ,2007).

Nevertheless, and in other words, the researcher stipulated these difficulties with mainly large intensity as follows:

1. Textbook content's exclusion of topics encouraging creativity: this is confirmed by the results of the study as items 9, 11, 12 and 17 have scored the highest means referring to the weak contribution of school textbooks in the development of creative thinking skills among students. This result can be attributed to the prescribed themes and activities presented in textbooks (Cheng, 2006).
2. Inadequate teachers' preparation and training, their fear of failure and difficulty of classroom management. This is referred to in items 18, 19, 20, 22 and 23 and confirmed by the actuality (according to the researcher experience) where the concept of creativity and its components are not addressed and even not taken into account neither in teacher preparation education programs nor in in-service training programs and workshops. This can be perhaps attributable to the novelty of this issue and the lack of well-trained specialists in this field (Gilbert, 1992 and Davies, 2004).
3. Teacher encouragement to creative teaching: this is either due to the constraints of administrative regulations as referred to in item 27 (School negative position towards using creative activities in teaching) and item 28 (Educational environment imposed by the school does not support innovation) or through the society in which teachers live, as shown in item 38 (lack of community interest for the creative teachers) as well as weakening of the supervisors and school principals' role in developing teachers for creative teaching . All these may result in teachers not adopting any teaching methods inspiring student creativity (Halliwell, 1993).
4. Weakness of teachers' Interior motives and their heavy workload. Besides to what is indicated in items 14, 19, 20, 24, 25, 29 and 34 (difficulties of large and moderate intensity), actual teaching practice confirms the fact that teachers are busy teaching and handling many administrative tasks, which diminishes their desire to use teaching methods that raise the creativity of learners and develop their own creativity. This will result in their preferences for using the traditional ways of teaching and evaluation methods (item 21 and item 36).
5. The absence of the atmosphere of the academic freedom: this is declared by teachers responses in items 27, 28, 30, 32 and 33, which shows the presence of conventional thinking among some school administrators, which in turn inhibits teachers' creative ideas and activities, as well as the presence of supervisors (item 37) who focus on traditional teaching skills and following literally the teacher guide and textbooks. The methods used / suggested in the curriculum for evaluation of students' learning and tests are emphasizing knowledge acquisition rather than creative thinking skills (item 36). Hence, these constraints are deemed to create an unfortunate environment for academically productive creativity.

***Question 2*:** Are there any significant differences in the difficulties teachers face in using creative teaching methods attributed to teachers' gender and the school district?

To answer this question, t-test was used. Table 9 shows that no significant difference exists due to gender and district ($p > 0.05$).

Table 9 shows that the t value is (0.19), indicating no statistically significant differences (at $p = 0.05$) with respect to the teacher's gender. This indicates that the degree of difficulty shows the same intensity and the impact with male and female teacher is alike. These results can be attributed to the similarity in the teacher education programs offered by academic institutions, and in the in-service training they receive. The Table also shows that the significant (0.92), indicating no statistical significant differences (at $p < 0.05$) with respect to the school district. This suggests that the degree of difficulty also shows the same intensity with basic education science teachers at Muscat and the interior region schools in Oman.

Similarly, this can be attributed to the top down approach of school administration that hinders teachers' creative abilities. This result is manifested in the rare application of creative teaching difficulties in the subject, teacher and school administration domains which show no impact on the larger scale of the school district.

Recommendations

1. Topics and issues that inspire and develop students' creativity should be included in school curricula.
2. Courses in creativity and creative teaching should be included in teacher education programs.

Table 9
Means, Standard Deviations and t. Test for the Gender and District Variables

Variable	Level	N	Mean	SD	t
Gender	Male	71	3.01	0.40	0.19*
	Female	59	3.03	0.39	
School	Muscat	78	2.98	0.40	0.92*
District	Interior	52	3.06	0.44	

* $p < 0.05$

3. The burden of teachers' administrative and teaching load should be reduced.
4. Appropriate incentives should be provided to teachers to encourage creativity and innovation in teaching methods.
5. The rules and regulations should be flexible enough to promote teachers' creative ideas.
6. Similar studies on the contribution of the school curriculum in the development of students' creative capabilities should be conducted.

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