

STUDYING THE DEVELOPMENT FACTORS OF STUDENTS' CREATIVITY BASED ON Q-METHODOLOGY

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Abstract. *In educational science today, there are many studies on the factors associated with students' creativity using various research methods. A new feature of our current study is to use Q-methodology to explore the teacher's perspective on the factors influencing students' creativity in the teaching process. We investigated the views of 42 lecturers working at three universities in Vietnam including Hanoi National University of Education, Can Tho University of Medicine and Pharmacy, National University of Civil Engineering. Results of Q-sort implementation of participants are processed using a special software dedicated to Q-methodology – Ken-Q Analysis version 1.0.6. The results of the study indicated that there are two factors affecting the development of the students' creativity. Factor 1 extracted was named as the psychological characteristics of the students themselves. Factor 1 with an eigenvalue of 22.79 accounted for 54% of the study variance and consisted of 23 lecturers defining for this factor. Factor 2 was named as characteristics of the teaching activity of teachers. It accounted for 8% of the study variance with an eigenvalue of 3.38 and contained 19 lecturers. These factors accounted for 62% of the total study variance. The results are considered as important suggestions for teachers and students to achieve the purpose of developing creative personalities. Moreover, this also is an instruction for educational managers to improve the quality of education at universities.*

Keywords: *Creativity, factor, lecturer, Q-methodology, student.*

Introduction

Creative human resources are considered as conditions determining the success of each country in the globalization process in all fields. Continual changes in modern society require education to constantly improve the quality of training. Creating highly creative human resources is seen as the task of every

education in every nation. Sadeghi and Ofoghi insisted in their research that: "One of the most important factors for the higher education systems is promoting creativity of their students" (Sadeghi & Ofoghi, 2011, p.263). In the study (Hamed, Preece, & Hashim, 2016), it is stated that creativity is an essential element of teaching and learning that brings delight and meaningfulness to the classroom and to students' learning experiences. Therefore, identifying the factors that develop students' creativity is the first concern of educational researchers in the modern world.

The purpose of our current study is to use Q-methodology to explore the perspective of Vietnamese teachers at different universities on the factors influencing students' creativity in the teaching process. The research results are considered as a valuable discovery to apply in the teaching process at universities with the aim of developing students' creativity. The essence of Q-methodology is a unique combination of the strengths of both qualitative and quantitative research technique that allows researchers to investigate the subjective viewpoints of participants on a research topic. It can be applied to improve the quality of educational research. However, this methodology is less applicable to previous educational studies. The use of Q-methodology is a new approach for this study.

Literature review

Various aspects of students' creativity have been explored in previous studies. It is believed (Ramankulov et al., 2016) that information and communication technologies are an effective means of formation of the creative potential of future physics teachers. In the research on teachers' creative teaching behaviors, (Hong et al., 2009) it is concluded that nine key factors that can affect teachers' creative teaching behaviors, namely personal quality, thinking style, family factor, education experience, teaching belief, personal effort, motivation, professional knowledge, and environmental factor. In the study (Hamed et al., 2016), it is concluded that creative teaching is influenced by four main factors: personal knowledge, personal efforts, teaching commitment and teaching beliefs. Richardson and Mishra have built an instrument to design creative learning environments in their study. It consists of three categories: physical environment; learning climate; and learner engagement (Richardson & Mishra, 2018). The creative teacher is considered an important factor to enhance students' creativity. Kazarenkov stated that the creativity of a teacher is impossible without self-knowledge, self-improvement, self-realization (Kazarenkov, 2011).

The relationship between creativity in the learning process and other factors is also explored in the following studies: creativity and academic

achievement (Habibollah et al., 2010), creativity and intelligence (Shrivastava, 2016), creativity and self-efficacy (Tamannaefifar & Motaghedifard, 2014), thinking and creative styles (Wechsler, Vendramini, & Oakland, 2012).

A new feature of our research is a holistic approach from two central elements of the learning process: teaching activities of teachers and learning activities of students. We identify all the elements that are relevant to teachers and students to bring about the development of students' creativity.

Methodology

The Q-methodology emerged in 1935, when the English physicist and psychologist William Stephenson presented it in a letter to the "Nature" journal (Brown, 1993). He was interested in finding new methods to study individual beliefs and attitudes. Currently, the use of the Q-method is significantly increasing in research in the field of psychology, social psychology, politics, etc (Mokry & Dufek, 2014).

Q-methodology was used to explore the perspective of Vietnamese teachers on the factors influencing students' creativity in the teaching process. We have used various methods to collect information related to research topic such as interviews, surveys, summarizing results of previous scientific publications and pilot study on a small group of 15 teachers. The Q-sample used in this study included 56 statements related to the different aspects of the teaching process. This is a collection of statements selected from the total number of statements that have been collected by various methods. The statements are numbered and printed on cards. The study involved 42 lecturers from various faculties at three universities in Vietnam including Hanoi National University of Education, Can Tho University of Medicine and Pharmacy, National University of Civil Engineering. The study sample consisted of 22 males and 20 females. The age of the lecturers is from 27 to 51. Teachers were asked to directly sort these cards into Q-grid according to printed instructions. The Q grid in this study consists of 11 point scale (from -5 to + 5). The results of the Q grid were carefully photographed and recorded in the results table of each study participant. The collected data is processed by specialized software for Q- methodology – Ken-Q Analysis version 1.0.6 (Banasick, 2019). Research data were analyzed by the varimax method and using the principal components.

Research results

The results of the Q grid of 42 lecturers were included in the factor analysis. The results showed that two factors were identified as accounting for

62% of the study variance. Detailed results are shown in Table 1. Lecturers with a significant loading on a factor define that factor.

The significance of the factor loading of respondents (at $p < 0.01$) is calculated by the following Formula 1 created by the author (Tiernon, Hensel, & Roy-Ehri, 2017).

$$2.58/\sqrt{n} \quad (1)$$

where n – number of statements in Q-sample

Table 1 Factor loadings of respondents performing Q-sorting

Lecturer	Factor loadings		Lecturer	Factor loadings	
	Factor 1	Factor 2		Factor 1	Factor 2
1	0.64x	0.37x	22	0.73x	0.27
2	0.73x	0.35x	23	- 0.10	0.75x
3	0.46x	0.48x	24	0.00	0.58x
4	0.66x	0.36x	25	0.43x	0.77x
5	0.52x	0.49x	26	0.30	0.70x
6	0.75x	0.30	27	0.29	0.80x
7	0.75x	- 0,05	28	0.31	0.73x
8	0.75x	0.31	29	0.42x	0.72x
9	0.73x	0.27	30	0.46x	0.75x
10	0.49x	0.41x	31	0.33	0.69x
11	0.81x	0.04	32	0.44x	0.81x
12	0.68x	0.40x	33	0.42x	0.82x
13	0.76x	0.27	34	0.42x	0.82x
14	0.81x	0.28	35	0.53x	0.73x
15	0.81x	0.28	36	0.57x	0.57x
16	0.14	0.45x	37	0.70x	0.49x
17	0.54x	0.32	38	0.78x	0.43x
18	0.14	0.45x	39	0.65x	0.57x
19	0.66x	0.37x	40	0.58x	0.66x
20	0.24	0.49x	41	0.73x	0.48x
21	0.78x	0.14	42	0.72x	0.48x

X: indicates a significance factor loading of respondents on one factor

In the current study, 56 statements were created in Q-sample, therefore, the Formula 1 becomes $2.58/\sqrt{56} = 0.34$. The factor loading of each lecturer is statistically significant on factor 1 or factor 2 or both when ≥ 0.34 .

Table 1 shows that 11 lecturers significantly loaded on factor 1; 9 lecturers significantly loaded on factor 2; 22 lecturers – both factors 1 and 2.

For example, lecturer 6 correlates 0.75 with factor 1. Lecturer 16 correlates 0.45 with factor 2. Student 1 correlates with both factors 1 and 2. (0.64 and 0.37).

From the data in Table 1, there are more than 50% of the lecturers significantly loaded on both factor 1 and factor 2. This shows the consensus relationship between these two factors in developing students' creativity in the learning process.

Table 2a Factor scores for statements (-5 to 5)

#	Statement	Factor 1	Factor 2
1	Knowledge of the discipline is easy to understand and remember	-1 ^b	-3 ^b
2	Democratic culture in the assessment, consideration of opinions	0 ^a	2 ^b
3	The teacher sets the standards for creative requirements in the learning process	-1 ^b	3 ^b
4	The student has creative knowledge, skills and experience	3 ^b	0 ^b
5	The teacher has a high academic degree	-4 ^b	-2 ^b
6	The teacher does not use active methods in the learning process	-3	-3
7	The teacher rarely uses teaching tools to promote student creativity in the learning process.	-4	-4
8	The classroom did not have enough equipment to support creative activity.	-3 ^b	-4 ^b
9	The university has a policy of encouraging the creativity of students and teachers.	2 ^b	-1 ^b
10	Learning tasks are very complex and difficult	-2	-3
11	In assessing learning results, the teacher highly appreciates new, unique and useful products.	1 ^b	3 ^b
12	Discipline has interesting, necessary knowledge.	1 ^a	0 ^a
13	The teacher has an attractive appearance	-3	-3
14	The student has a confident, risky character and the courage to accept defeat	5 ^b	0 ^b
15	The teacher uses fun elements in teaching.	0 ^b	4 ^b
16	Learning activities do not stimulate the imagination, curiosity of students	-4	-4
17	Student's family highly appreciates creativity in everyday life	1 ^b	-2 ^b
18	The teacher is ready to support the creative process of students during classes	2 ^b	5 ^b
19	The student has attention and effort in the learning process.	2 ^b	0 ^b
20	Teaching activity of teachers creates motivation for students creativity	2 ^b	5 ^b
21	The student has friends in the group who have creative thinking.	-2	-2
22	University usually organizes creative experience activities	1 ^b	2
23	The student can participate in many activities in the group	2	3 ^b
24	The student has a need to develop creative competence in the learning process	3 ^b	1 ^b
25	There is no learning consciousness in the class: students are often late, do not actively cooperate with teachers and other students in the group.	-5	-4
26	The teacher has observation, satisfaction the various needs of students in the group	0 ^b	4 ^b
27	The arrangement of tables and chairs is suitable for carrying out a variety of activities in the classroom	-2	-1
28	The teacher guarantees temperature, lighting in the classroom	-2 ^b	-1 ^b

^asignificant distinguishing statement at $p < 0.05$;

^bsignificant distinguishing statement at $p < 0.01$.

A factor score is a score for a statement as a “kind of average” of the scores given that statement by all of the Q-sorts associated with the factor [3]. In the study using Q methodology, the factor score is the main basis for factor interpretations. The names of two extracted factors are called by the names of statements with high factor scores.

In our study, we explored the perspective of Vietnamese teachers on the factors influencing students' creativity in the teaching process. The results of the study indicated that there are two factors affecting the development of the students' creativity. Factor 1 extracted was named as the psychological characteristics of the students themselves. Factor 2 was named as characteristics of the teaching activity of teachers.

Factor 1 - The psychological characteristics of the students themselves

Factor 1 with an eigenvalue of 22.79 accounted for 54% of the study variance and consisted of 23 lecturers defining for this factor.

In factor 1, Vietnamese lecturers viewed a high level of agreement with the following statements: “The student has a confident, risky character and the courage to accept defeat” (14: +5**); “The student has a positive attitude, interest in creative activity” (36: +5**); “The student has curiosity and active awareness” (41: +4**); “Students have confidence in their creativity” (33: +4**); “Student has internal motivation for creativity” (53: +4**); “Student has creative thinking and creative habit” (44: +4); “The student has creative knowledge, skills and experience” (04: +3**); “The student has a need to develop creative competence in the learning process” (24: +3**).

Factor 2 - Characteristics of the teaching activity of teachers.

Factor 2 with an eigenvalue of 3.38 accounted for 8% of the study variance and consisted of 19 lecturers defining for this factor.

In factor 2, Vietnamese lecturers viewed a high level of agreement with the following statements: “The teacher is ready to support the creative process of students during classes” (18: +5**); “Teaching activity of teachers creates motivation for students creativity” (20: +5**); “The teacher is a model example of creativity” (31: +4**); “Style of leadership, management and organization of classes teachers” (40: +4**); “The teacher has observation, satisfaction the various needs of students in the group” (26: +4**); “The teacher uses fun elements in teaching” (15: +4**).

Table 2b Factor scores for statements (-5 to 5) (continued)

#	Statement	Factor 1	Factor 2
29	The teacher and students have a positive relationship in the learning process	3 ^a	3 ^b
30	Students' high intelligence leads to high creative abilities	-1	0
31	The teacher is a model example of creativity	0 ^b	4 ^b
32	The university has creative clubs	-1	0
33	Students have confidence in their creativity	4 ^b	1 ^b
34	The teacher refuses to answer students' questions outside of class time	-5	-5
35	The teacher has awards for students who have creative achievements	0	1
36	The student has a positive attitude, interest in creative activity	5 ^b	1 ^b
37	The teacher provides fairness and objectivity in the assessment of students	0 ^b	3 ^a
38	Combining the assessment of teachers and students in the learning process	1	1
39	The content of the discipline includes many practical exercises	-1	-1
40	Style of leadership, management and organization of classes teachers	1 ^b	4 ^b
41	The student has curiosity and active awareness	4 ^b	2 ^b
42	Students are stimulated to new ideas.	3	2
43	The teacher does not use group forms of teaching	-4	-5
44	Student has creative thinking and creative habit.	4 ^b	1 ^b
45	The student has independence in solving learning tasks	2 ^b	0 ^b
46	The teacher who has studied abroad	-3 ^b	-2 ^b
47	The teacher allows students to solve learning problems in their own way	3	3
48	In a collective has a collaborative, friendly psychological atmosphere.	1	2
49	The student lives in a creative collective	0 ^b	-2 ^b
50	The health status of students in the group	-2 ^b	-1 ^b
51	The psychological atmosphere of a group of students in the process of interaction	0	1
52	The number of students in the class is small (≤ 50 students)	-2	-1
53	Student has internal motivation for creativity	4 ^b	2 ^b
54	The economic condition of the student family	-3	-3
55	Student lives in a family with a democratic atmosphere	-1	-1
56	Student's parents are examples of creativity	-1 ^a	-2 ^a

^asignificant distinguishing statement at $p < 0.05$;

^bsignificant distinguishing statement at $p < 0.01$.

Conclusion

Our current study is to use Q-methodology to explore the 42 lecturers' perspectives at three universities in Vietnam on the factors influencing students' creativity in the teaching process. The results of the study indicated that there are two factors affecting the development of the students' creativity. Factor 1 - The psychological characteristics of the students themselves. Factor 2 - Characteristics of the teaching activity of teachers. Each factor includes many different elements. These two factors have close relationships in the teaching process. The outcome of one factor affects the development of the other. The

perfect result of the development of the student's creativity is indispensable in one of two factors.

The results are considered as important suggestions for teachers and students to achieve the purpose of developing creative personalities. Moreover, this also is an instruction for educational managers to improve the quality of education at universities.

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