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STUDENTS' BELIEFS ABOUT CREATIVITY

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Abstract:

Creativity; a nature or nurture matter? Do some individuals have it and some do not? Traditionally, individuals involved with arts have been considered to be more creative as art-related professions may require more creative thinking than some other professions. At the same time, those involved with the sciences, e.g. mathematicians, chemists, computer scientists, and others are to-date not seen as being very creative [Official Statistics, 2015]. To contradict this viewpoint, research showed that we can all develop our creative thinking skills and ideas and we all have the capability of being creative. In fact, creative thinking might be the key to success in any profession since a creative solution might lead to a new innovation. In particular, at times of need, such as the recent global COVID-19 pandemic, almost all individuals, irrespective of profession, had to exhibit creativity in dealing with extraordinary situations. It should therefore be interesting to see to what extent are these societal beliefs about "creative and non-creative individuals" affecting our potential for creative thinking. As research showed that creativity can be developed, researchers got interested in investigating the role of the educator. At the same time, it should be interesting to investigate the beliefs of students about creativity as these might potentially affect their efforts to expand their creative thinking. This had been the aim of the present study which showed that the students believe that creative thinking is very important for the well-being and success of humanity to solve its problems. Students also believe in their own ability for creative thinking and their potential to improve their creative skills. They perceive such improvement as being possible to achieve via the education stream and they appreciate the supportive role of the educational environment towards teaching for creativity. The authors would like to conduct further research in order to: (i) compare and contrast the beliefs of students to those of teachers regarding creative thinking and teaching for creativity and (ii) approach creative thinking from the context of different specialties and programs of study both for the students and the educators.

Keywords: Creativity; Higher Education

I. INTRODUCTION AND BACKGROUND

There exist many reasons which support that engaging in creative thinking is beneficial at the atomic, group, business, and societal setup [Carson, 2019]. Creativity and innovation are essential learning skills in the 21st century for students in order to succeed in their careers [Trilling & Fadel, 2009], [Applied Educational Systems, 2019]. At the tertiary education level, creative thinking is considered to be an "essential learning outcome" [National Leadership Council for Liberal Education and America's Promise, 2007]. For those disciplines which have traditionally been related to creativity such as the arts and humanities, creativity was always sought after. For business, the sciences and engineering disciplines, creative thinking is nowadays viewed as critical [Daly, et al., 2016 citing Harvard Business School Press, 2003, Kirby, 2004 and ABET Board of Directors, 2011]. The environment in which businesses are competing as well as the emerging needs of the society are requiring our most flexible, innovative, creative thoughts and actions being put forward. This is more so now than ever, with the recent extraordinary and dire period that we experienced due to the global pandemic of COVID-19. At times of need such as this, creative thinking is most desirable and might prove to be life-saving.

More than forty related but different definitions for creativity are listed in literature [Kampylis and Valtanen, 2010]. One such definition is the following: "Creativity is the intellectual ability to make

creations, inventions, and discoveries that bring novel relations, entities, and/or unexpected solutions into existence" [Wang, 2013].

Most definitions couple creativity to innovation. Other characteristics of creativity include: creativity is domain-based; creativity and talent can be developed; and creativity is not a general aptitude, but is dependent on the demands of the domain [Piirto, 2000]. Very importantly research supports that all individuals are capable of demonstrating creativity to some degree [Cropley, 2001, Rhodes, 1987, Sternberg and Lubart, 1995]. There is also strong support that individuals can develop their creative process skills with the right learning experiences [Daly, et al., 2016]. This involves working on being imaginative, having insight or intuition, being open and perceptive, being willing to take risks, and having a high tolerance for ambiguity, as all of these have been identified as key personality attributes which contribute to creativity [Vinyets, 2014].

TEACHERS' PERCEPTIONS ABOUT CREATIVITY

For educators it should be seen as a challenge to find creative ways to encourage and cultivate into students' minds the attributes which lead to creative thinking. A number of components of teaching for creativity have been identified including: teacher skills and attitudes; awareness of learners' needs; flexible approaches to curriculum and lesson structure; a willingness to act as a role model; particular types of classroom interaction with pupils; the use of ICT; and assessment [Davies, et al., 2014].

There is definitely a potential for educators to promote creativity but at the same time there is also a possibility of inhibiting it in their classrooms [Davia Rubenstein et al., 2013]. Alongside, a supportive educational environment has also been emphasized. Thus, as the role of the educators in very important in the effort to cultivate creative thinking, the perceptions and beliefs of educators about creativity have been of interest to researchers [Fryer & Collings, 1991, Westby & Dawson, 1995, Kampylis, et al., 2009, Diakidoy & Phtiaka, 2001, Al Jughaiman & Mowrer-Reynolds, 2005, Davia Rubestein, et al., 2013]. Though the conclusions reached by researchers regarding the educators' perceptions about creativity might not be the same, overall, educators stated that they believe in the value of creativity. They also believe that creativity can be developed in any person and that they have the ability to promote creative thinking among their students [Kampylis, Berki, & Saariluoma, 2009, Davia Rubestein, et al., 2013, Diakidoy and Kanari, 1999].

STUDENTS' PERCEPTIONS ABOUT CREATIVITY

According to past research, teachers' doubts about the students' potential for creativity may be the biggest hindrance to creativity development [Plucker & Beghetto, 2003, Plucker et al., 2004]. An even bigger obstacle to fostering creativity thinking via education may be the students' self-efficacy regarding their potential to improve their creative thinking skills.

The presently available research presents a gap in investigating the students' perceptions about creativity as very few studies are available on this topic. In the [Ho et al., 2006] study among tertiary education students, some important findings were that students agreed that creativity is the result of a consistent effort and it can be found in everyone and across many fields. Also, [Kazerounian & Foley, 2007] who studied the barriers to creativity in Engineering education, found that the students who participated in the study did not have an experience of an educational environment conducive to fostering creativity.

Thus, the current study was initiated to investigate the beliefs of students regarding creativity and creative thinking. Our study aimed at capturing students' beliefs in response to the following four research questions:

RQ1: "How important is creativity for the society in general?"

RQ2: "What is the potential for students to become more creative?"

RQ3: "What do you believe about your educators' ability to promote student creativity?"

RQ4: "How do you perceive the role of your educational environment in relation to creativity teaching?"

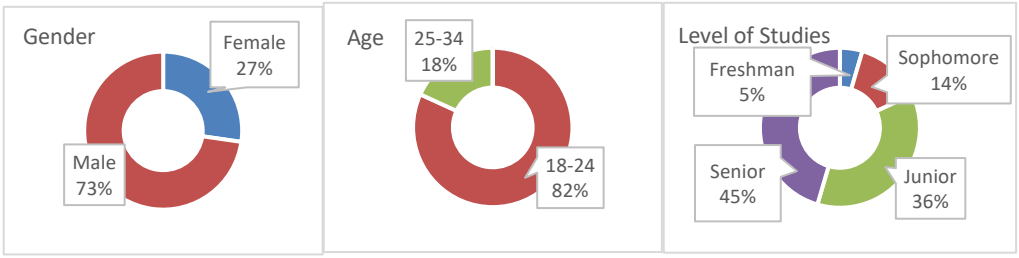
II. METHOD

PARTICIPANTS

The survey population consisted of 22 university students (N=22) who have voluntarily contributed to an online questionnaire after they completed an elective course offered by the Department of Computer Science to students of the Computer Science and other programs. The majority of the participants (73%) were male, between 18-21 years of age (82%). Also, the majority of the participants were in their last year of studies (senior students - 45%). The summarized demographic information of the participants is shown in Table 1 and Figures 1-3.

Table 1 Demographic information

N=22	#	%
Sex:		
Female	6	27
Male	16	73
Age:		
Under 18	0	0
18-24	18	82
25-34	4	18
35-44	0	0
45+	0	0
Level of studies:		
Freshman	1	5
Sophomore	3	14
Junior	8	36
Senior	10	45



Figures 1-3 Graphical representation of demographic information

RESEARCH INSTRUMENT

The research instrument was an anonymous online questionnaire. Besides demographics, the research instrument included 43 items investigating the four research questions. All of the items were evaluated on a seven-point (from Strongly Agree to Strongly Disagree) Likert scale. The basis for the research instrument were the Teaching for Creativity Scales of [Davia Rubestein, et al., 2013] from which all items were adopted but some of them were adapted in order that they would be suitable for students. Though the instrument originally included 43 items, some items (7) were later on deleted by the developers of the tool to improve scale reliability. These items are therefore not presented in the subsequent analysis of the survey.

DATA GATHERING PROCEDURE

Students completing a science course in the Spring 2019 semester were invited to participate in the survey on a voluntary basis. The group included students of the Computer Science,

Management Information Systems and other majors. The questionnaire could be answered in about 5-10 minutes.

III. RESEARCH FINDINGS

In this section, the research findings in relation to the four research questions are presented. Only selected items are discussed while all of the quantitative data appear in Tables 2-5 and the accompanying Figures 4-7.

RESEARCH QUESTION 1

The first research question was investigating the beliefs of students regarding the importance of creativity for the society in general. The topic was covered by ten items in the survey.

The overwhelming majority of the students believe that creativity has great value for the society. The greatest majority of them, "Strongly Agreed", "Agreed", or "Somewhat Agreed" with all of the items which were examining their beliefs about the value of creativity for the society.

"Without new and creative ideas, our country will be left behind" and "*We really need creative people*" are the top two items that received 50% and over support by the students who noted that they "Strongly Agree" with these statements. It is also important to note that an 89% of the students agree with "*I believe thinking creatively is the most important skill for students to learn*". Moreover, an 83% of them believe that "*New ideas must be generated to enact positive change*".

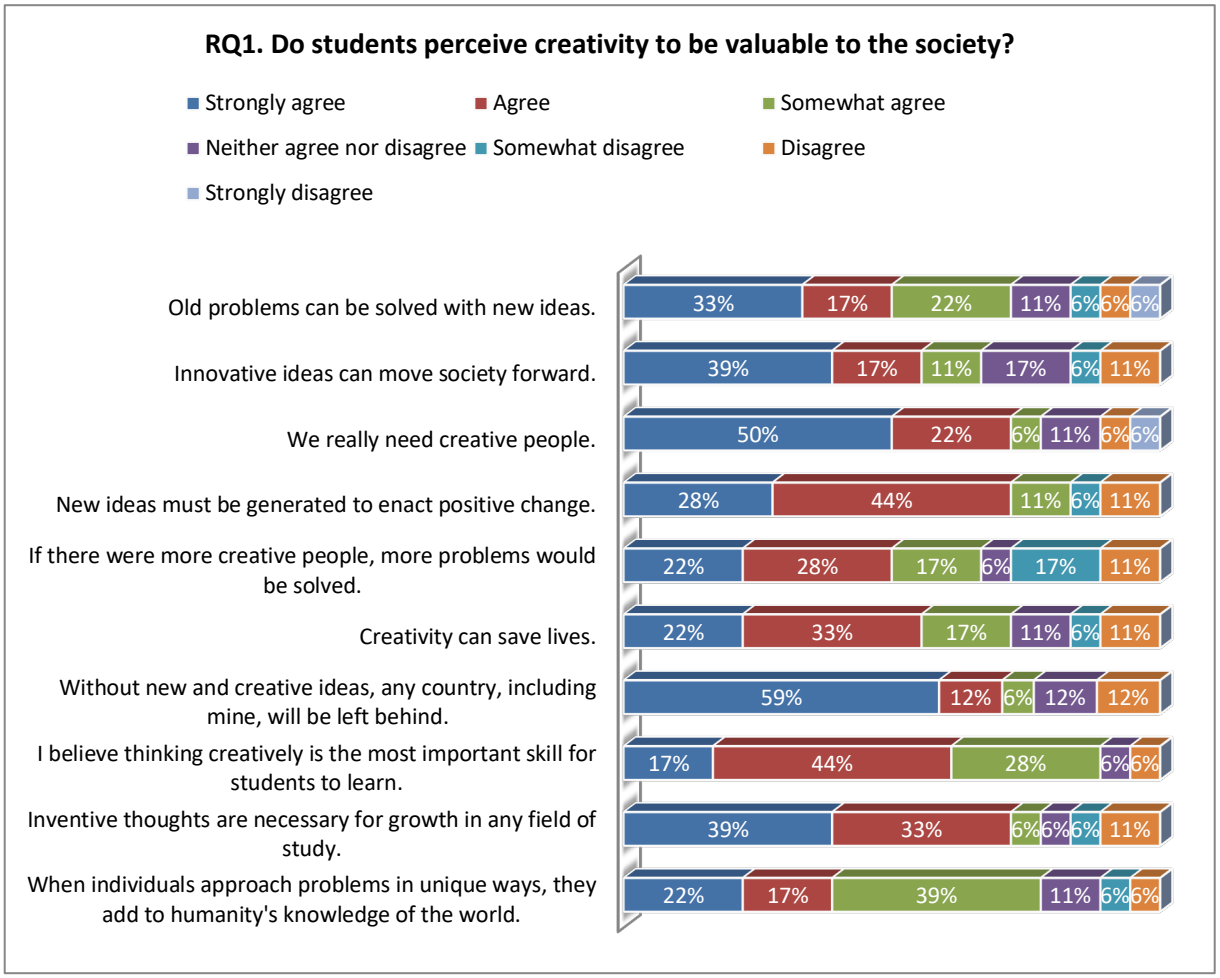


Figure 4 Research Question 1 - Societal Value

Table 2 Research Question 1 - Societal Value

	Strongly Agree (%)	Agree (%)	Somewhat Agree (%)	Neither Agree nor Disagree (%)	Somewhat Disagree (%)	Disagree (%)	Strongly Disagree (%)
1 When individuals approach problems in unique ways, they add to humanity's knowledge of the world.	22	17	39	11	6	6	0
2 Inventive thoughts are necessary for growth in any field of study.	39	33	6	6	6	11	0
3 I believe thinking creatively is the most important skill for students to learn.	17	44	28	6	0	6	0
4 Without new and creative ideas, our country will be left behind.	59	12	6	12	0	12	0
5 Creativity can save lives.	22	33	17	11	6	11	0
6 If there were more creative people, more problems would be solved.	22	28	17	6	17	11	0
7 New ideas must be generated to enact positive change.	28	44	11	0	6	11	0
8 We really need creative people.	50	22	6	11	0	6	6
9 Innovative ideas can move society forward.	39	17	11	17	6	11	0
10 Old problems can be solved with new ideas.	33	17	22	11	6	6	6

RESEARCH QUESTION 2

The second research question was investigating the beliefs of students regarding their potential to become more creative. This topic was investigated by six items in the survey.

Albeit, students overall trust their creativity ability and potential to improve their creativity skills, they do not feel very strongly about all of the statements made in this group.

As many as 78% of the students believe that "*All students can grow in their creative problem-solving skills*" but a high 55% of them disagree with "*Creativity is an ability that all student possess*". In fact, except from this statement for which the students' opinions were almost divided, in the rest of the statements we can see that the students were disposed positively. Nevertheless, since self-efficacy or believing in ones' self is very important for achieving any goal, the fact that only 34% of the students believe that creativity is an ability that everyone has, is not to be overlooked as it might prove to be a strong hindrance in an educator's efforts to improve students' creativity skills.

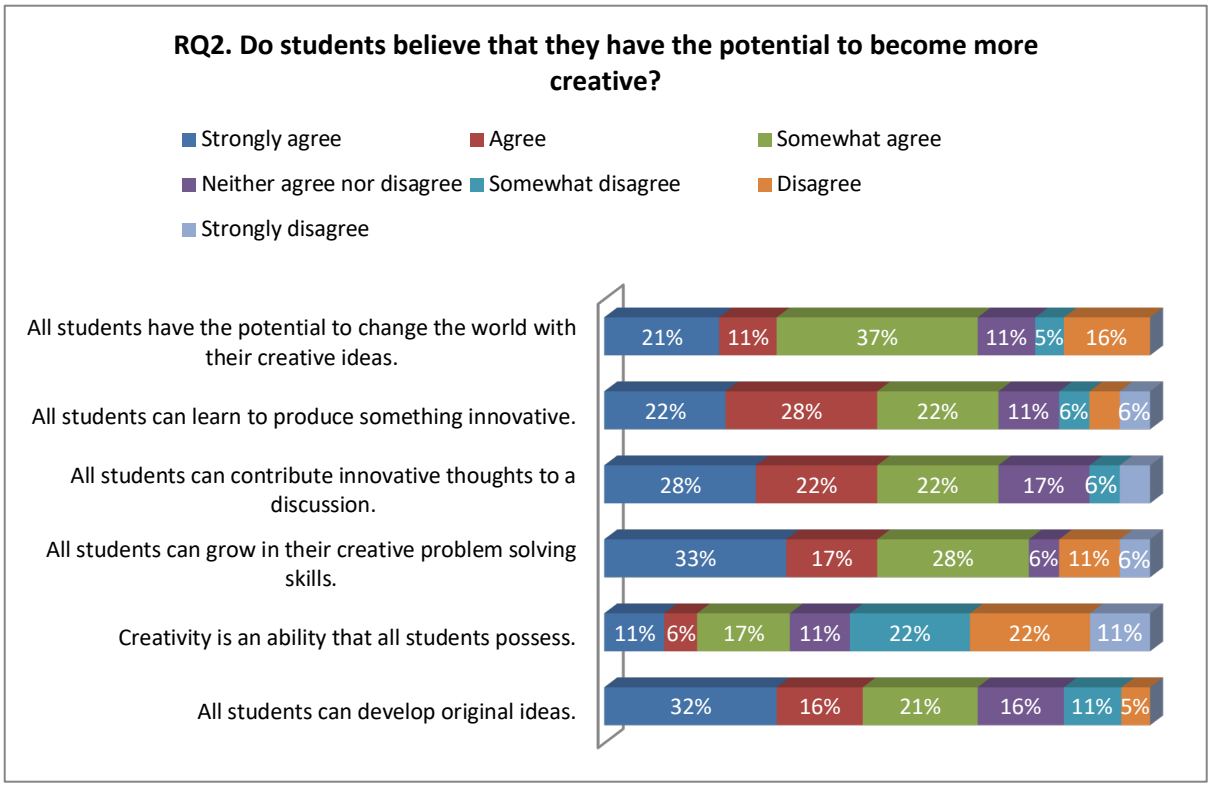


Figure 5 Research Question 2 - Student Self-Efficacy

Table 3 Research Question 2 - Student Self-Efficacy

	Strongly Agree (%)	Agree (%)	Somewhat Agree (%)	Neither Agree nor Disagree (%)	Somewhat Disagree (%)	Disagree (%)	Strongly Disagree (%)
1 All students can develop original ideas.	32	16	21	16	11	5	0
2 Creativity is an ability that all students possess.	11	6	17	11	22	22	11
3 All students can grow in their creative problem-solving skills.	33	17	28	6	0	11	6
4 All students can contribute innovative thoughts to a discussion.	28	22	22	17	6	0	6
5 All students can learn to produce something innovative.	22	28	22	11	6	6	6
6 All students have the potential to change the world with their creative ideas.	21	11	37	11	5	16	0

RESEARCH QUESTION 3

The third group of statements was looking into the students' trust in their class and educator in regards to his/her ability to promote student creativity. Thus, most of the statements in this group were slightly changed from their original version in the "Teaching for Creativity Scales" tool to work for the specific course and educator. Nonetheless, a number of statements can reflect on students' opinions about teaching for creativity in more general terms. The topic was investigated by thirteen items in the survey.

The students responded positively to all of the statements in this category. Their agreement with these statements was noted with percentages ranging from 53-89%. The lowest 53% aggregate of "Strongly Agree", "Agree", and "Somewhat Agree" was given to item 2, "This class has enhanced my abilities to take meaningful academic risks" and the highest, 89%, to item 7, "The lecturer has promoted flexible thinking".

The items of this section can be grouped in two sub-groups. The first sub-group related to promoting creative thinking in the context and timeframe of the specific class. This sub-group included items 1,2,4,5,8,9,10, and 13. Only item 2 (mentioned above) was questioned by 32% who remained neutral, while for the rest of the items the greatest majority of the students replied positively noting that the class offered to the promotion of their creative thinking. The second sub-group was more related to the efforts of the lecturer to promote creative thinking. This refers to items 3,6,7,11,12. From this second sub-group, item 11, "The lecturer has increased the quantity of original thoughts that the students have", was questioned by 33% of the students who decided to neither agree nor disagree with the statement. For the remaining items the overwhelming majority supported that the lecturer has promoted creative thinking overall and more specifically their creative problem-solving and flexible thinking skills.

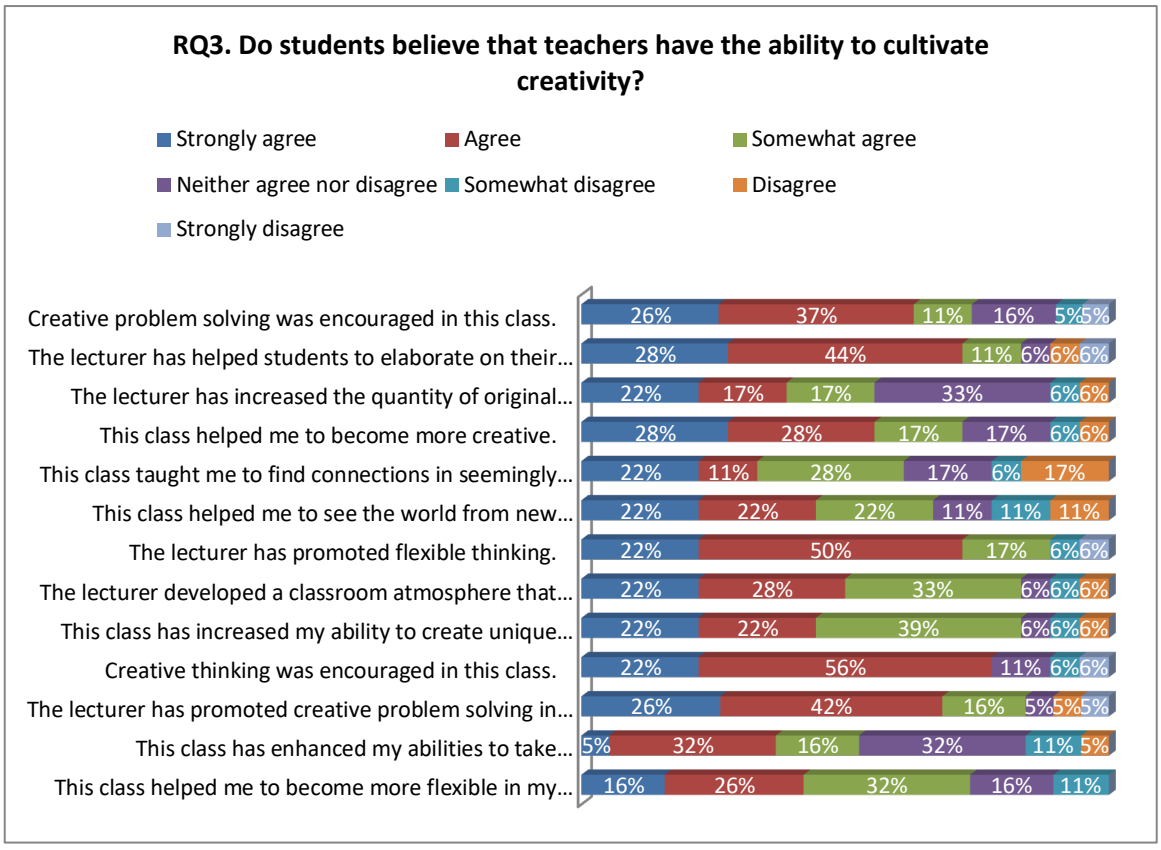


Figure 6 Research Question 3: Educator Potential for Teaching for Creativity

Table 4 Research Question 3: Educator Potential for Teaching for Creativity

	Strongly Agree (%)	Agree (%)	Somewhat Agree (%)	Neither Agree nor Disagree (%)	Somewhat Disagree (%)	Disagree (%)	Strongly Disagree (%)
1 This class helped me to become more flexible in my thinking.	16	26	32	16	11	0	0
2 This class has enhanced my abilities to take meaningful academic risks.	5	32	16	32	11	5	0
3 The lecturer has promoted creative problem solving in the classroom.	26	42	16	5	0	5	5
4 Creative thinking was encouraged in this class.	22	56	0	11	6	0	6
5 This class has increased my ability to create unique solutions.	22	22	39	6	6	6	0
6 The lecturer developed a classroom atmosphere that welcomes imagination.	22	28	33	6	6	6	0
7 The lecturer has promoted flexible thinking.	22	50	17	0	6	0	6
8 This class helped me to see the world from new perspectives.	22	22	22	11	11	11	0
9 This class taught me to find connections in seemingly unconnected ideas.	22	11	28	17	6	17	0
10 This class helped me to become more creative.	28	28	17	17	6	6	0
11 The lecturer has increased the quantity of original thoughts that the students have.	22	17	17	33	6	6	0
12 The lecturer has helped students to elaborate on their own unique ideas.	28	44	11	6	0	6	6
13 Creative problem solving was encouraged in this class.	26	37	11	16	5	0	5

RESEARCH QUESTION 4

The last area of interest related to the role of the educational environment to promote creative thinking through teaching. The educational climate was captured by seven items in the survey.

The students perceived the educational climate as being mostly positive towards creativity even though they were not sure whether that was included in the university's priorities.

Table 5 Research Question 4: Environmental Encouragement

	Strongly Agree (%)	Agree (%)	Somewhat Agree (%)	Neither Agree nor Disagree (%)	Somewhat Disagree (%)	Disagree (%)	Strongly Disagree (%)
1 My university stresses the fostering of creative thinking in the classroom.	0	26	26	26	16	5	0
2 Teaching creative thinking would not be frowned upon in my university.	0	21	11	21	16	16	16
3 My university's priorities include teaching students to think creatively.	5	0	37	16	21	21	0
4 My university's administration encourages lecturers to foster innovative thinking in their students.	11	17	33	28	6	6	0
5 My university environment encourages lecturers to produce independent thinkers.	6	17	17	33	22	6	0
6 My current school's environment places great value on the development of student creativity.	6	17	33	22	11	11	0
7 It is a priority in my school to increase students' inventiveness.	17	22	28	17	17	0	0

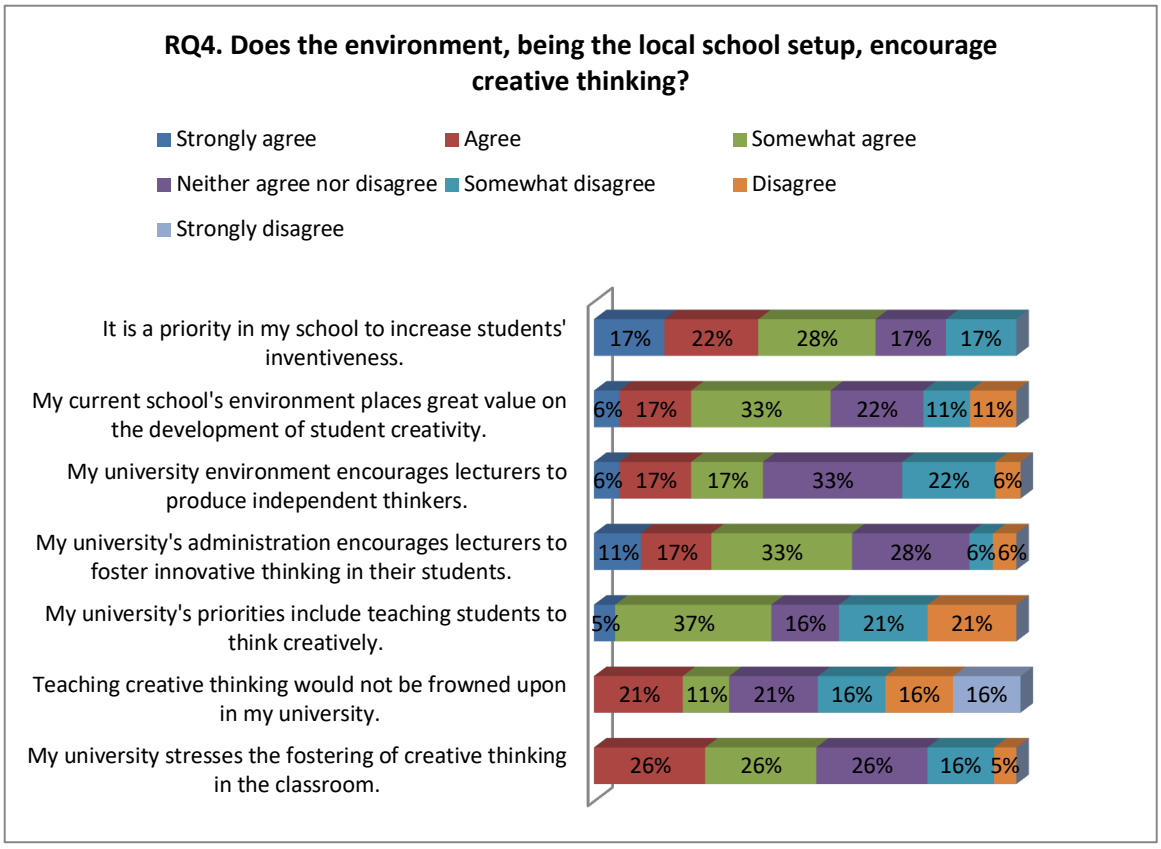


Figure 7 Research Question 4: Environmental Encouragement

IV. OVERALL RESULTS

The overwhelming majority of the students who participated in this study, all 75% of them, support by stating their strong agreement (32%), agreement (26%), or somewhat agreement (17%) that creativity has great value for the society versus those who support the opposite (15%) (Figure 8).

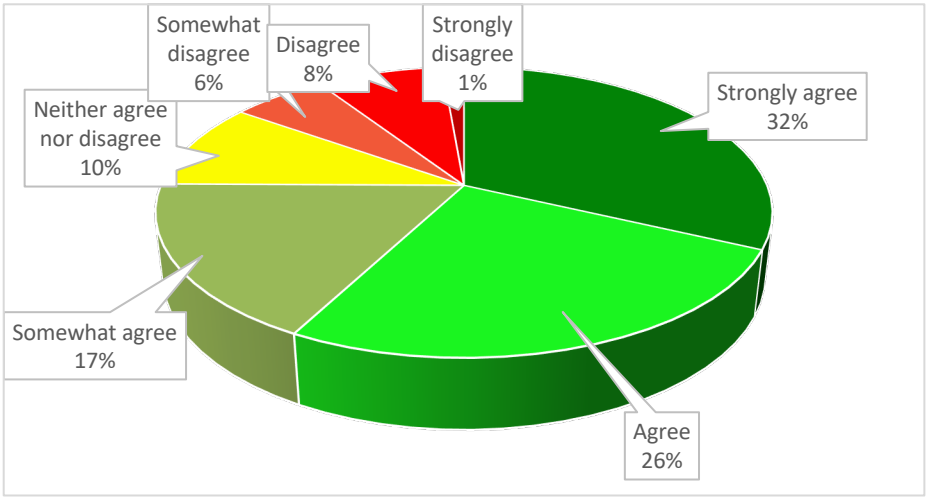


Figure 8 Overall Creativity Value for the Society

Overall, the perceptions of students about their own potential for being creative are clearly positive. As many as 65% of them believe in student creativity and their potential for creative thinking. Only 23% are not considering themselves and their classmates as being creative, and 12% are not sure about it (Figure 9).

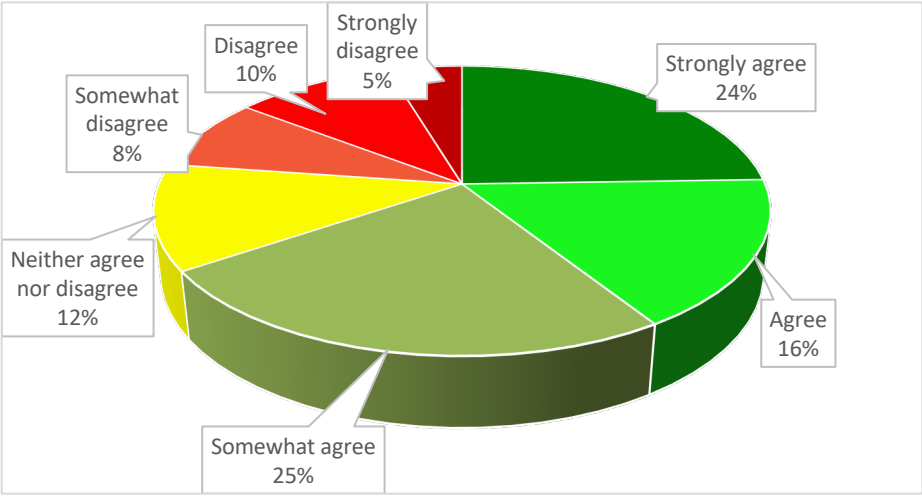


Figure 9 Overall Students' Potential for Creativity

The students who have participated in the study upon the completion of a science course have evaluated their course and lecturer in regards to the promotion of creative thinking very positively. A very high 72% of the students thought that the course and the lecturer have promoted the students' creative thinking, increased their ability to create unique and flexible solutions, and encouraged them to elaborate on their own unique ideas (Figure 10).

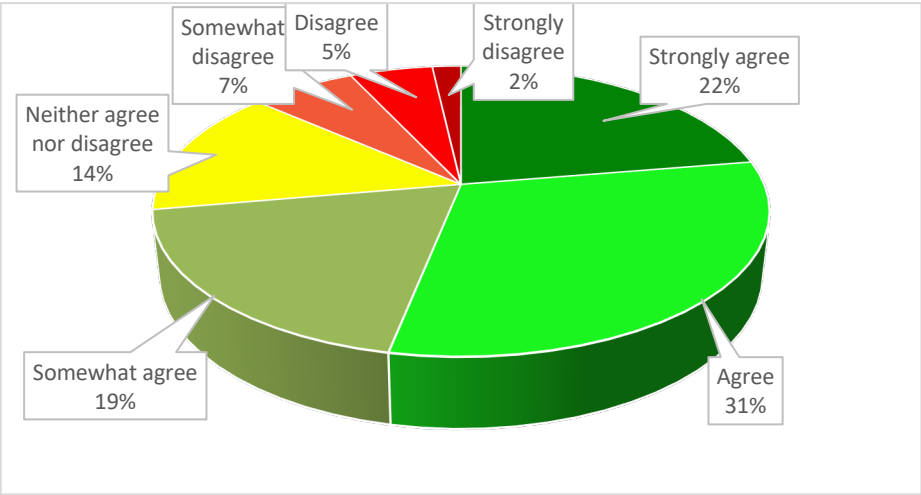


Figure 10 Overall Educators' Ability to Promote Creativity

Lastly, in regards to the support offered by the educational environment towards creativity building, the students supported by 50% that the HEI is supportive to teaching for creativity, 23% remained neutral and the remaining 27% perceived the role of the institution as being negative to the promotion of creativity. (Figure 11).

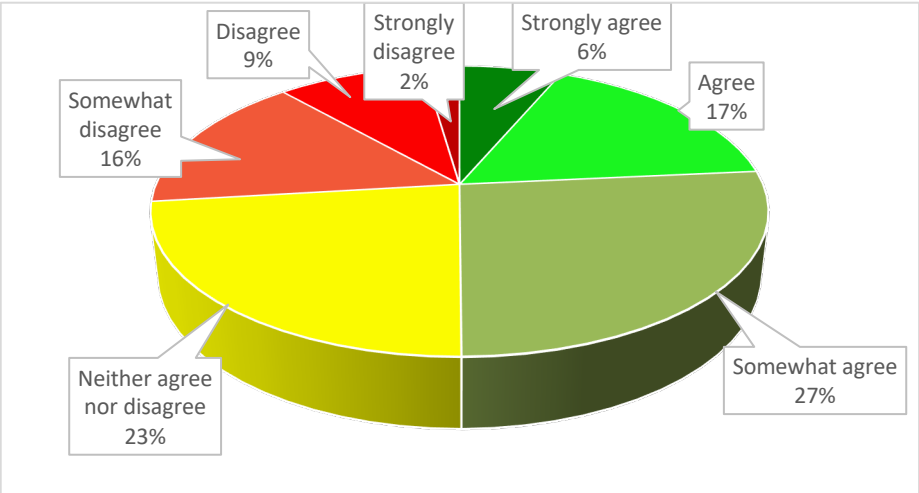


Figure 11 Environment's Encouragement for Creative Thinking

V. FURTHER RESEARCH AND CONCLUDING REMARKS

The concluding remarks of the study are the following:

- A high majority (75%) of the participating students believe that creativity has great value for the society.
- The majority (65%) of the students also believe in their potential to practice creative thinking.
- A very high percentage (72%) evaluated positively the lecturer's efforts to promote creative thinking and the course which was delivered.
- Finally, the students appeared to be divided about the role of the educational institution in regards to the support offered towards creative thinking.

Creative thinking is very important for the society and this sparks the interest to research how to nourish it. Though the authors would also be interested in investigating individual creativity with information technology as in [Schwarz et. al., 2013], the present study can also be expanded to consider more students from different disciplines and to look for similarities and differences in the perceptions of educators and students regarding issues of creativity in different disciplines and across them. The study would also benefit from some qualitative data from students that might be facilitated via some interviews. Such data might prove to be helpful in achieving some insight regarding the perceptions of students about creativity.

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