

DOES OUR EDUCATIONAL SYSTEM ENHANCE CREATIVITY AND INNOVATION AMONG GIFTED STUDENTS?

M. Aichouni^{1*}, R. Al-Hamali, A. Al-Ghamdi, A. Al-Ghonamy, E. Al-Badawi,
M. Touahmia, and N. Ait-Messaoudene

¹University of Hail, Saudi Arabia, m.aichouni@uoh.edu.sa

*Corresponding Author

Abstract

We are living in a dynamic global world and our nation's prosperity depends critically on the knowledge, innovation and creativity skills generated by our educational systems. Creativity, innovation and quality systems are considered to be at the heart of successful strategies adopted by modern economies. In general terms they are meant for the creation and adoption of new knowledge to improve the value of products, processes and services delivered to customers. The present investigation has been carried out within a national research project funded by the Saudi ministry of education, with the major aim to enhance and develop creativity and innovation among Saudi students (schools and universities) and business leaders. In this paper we present an assessment of creativity and innovation at the educational system from the perspective of its customers, i.e the students. Based on the literature review a theoretical research framework was developed and a survey questionnaire was designed for the purpose. Respondents were selected among Saudi gifted students who participated in the national competition on giftedness 2015 run by the ministry of education in the region of Hail, north the kingdom. The survey instrument measures the students' personal perceptions on creativity and innovation, their educational environments and programs, the management support, and the future prospects the university would offer to them. The study aims to identify practical recommendations towards the adoption of new strategies to enhance creativity and innovation among Saudi students.

Keywords: Educational System, Creativity, innovation, gifted students, Saudi Arabia

1. INTRODUCTION

Creativity, innovation and quality management systems have been placed at the heart of successful strategies adopted by modern economies. In general terms they are meant for the creation and adoption of new knowledge to improve the value of products, processes, and services delivered to citizens. They have been recognized as a source of competitive advantage by policy makers as well as industry practitioners around the world. In their efforts to develop their nations, Gulf countries started new reforms in their educational systems and research institutions for transforming their economies from oil-based economies to knowledge-based economies. In Saudi Arabia, such efforts consisted of restructuring of the existing educational system (the merge of the ministry of education with the ministry of higher education), the opening of new universities, technical colleges and research institutes, and the establishment of innovation centers, technology valleys, research chairs and creativity and innovation programs (Khan, Al-Saud, Al-

Khahtani & Al-Derham, 2014, and Khorsheed & Al-Fawzan, 2014, Aichouni et. Al, 2014). In a recent study Al-Sudairi & Bakry, 2014, noticed that, while the Saudi government spending and allocated budgets on the education system far exceeds that of distinguished countries such as Malaysia and Brazil, the knowledge delivery state in the country is still below expectations relative to these countries. They noted that what is needed is the building of a knowledge national culture that promotes people's drive towards knowledge generation and innovation and towards making efficient utilization of the newly generated knowledge. Iqbal, 2011, in another study, presented an overview of state of the creativity and innovation in Saudi Arabia and discussed the low level of "creative outcomes" reported in the Global Innovative Index (GII). It was concluded that this is an area which needs further investigations and supports from the Saudi educational and economic organizations. A model was proposed to enhance creativity and foster innovation within organizations. This model was based on human skills, government support and investment in R&D, and increasing knowledge through education-industry linkages at the country level in which capital and R&D support are assumed to increase innovation and to enhance creativity.

The present study which falls in this perspective is based on the outputs of a National research project, entitled "Program for Creativity and Innovation Skills Development through Quality and Organizational Excellence Concepts" (Aichouni et al., 2014). The project is funded by the Saudi ministry of Education within the framework of a national initiative that focuses on the development of creativity and innovation among students, faculty members through collaborative scientific research and community services. The program aims to enhance and foster creativity and innovation skills through quality concepts and tools and business excellence models and to contribute to improve learning strategies, by creating a pedagogical framework so as to raise awareness on the importance of creativity and innovation to empower individuals in the Saudi educational system (students and faculty members) and to transfer and develop innovation in national organizations.

The objective of the present study is to measure creativity and innovation in the educational system in Saudi Arabia from the customers' perspective. The study is mainly interested to answer fundamental questions related to how far the Saudi educational system encourage its stakeholders and customers to be creative and innovative, and what are the major predictors of such creativity and innovation level? A special attention was made to the gifted students; in this study the following definition is adopted, a "*gifted student is defined as the college student who passed standards creativity tests through an official screening program and is participating in the National Olympiad for Scientific Creativity – Mawhiba 2015*". The National Olympiad is run every year by the ministry of education across the country with the primary objective to enhance discovery and to develop creativity and innovation skills among Saudi students and to prepare them to contribute in the building of Knowledge based economy sought by the country leadership. The national organization responsible for the "Mawhiba" project is The King Abdul-Aziz and his Companions Foundation for Giftedness and Creativity, founded in 1999, an independent non-profit organization based in Riyadh and dedicated to identifying and supporting young gifted and talented Saudi students. The declared mission of this organization is "To support the establishment and development of a creative environment and society so the talented and gifted individuals can harness and exploit their talents to serve the nation". Table 1, shows the statistics of the 2015 Olympiad for Scientific Creativity (Mawhiba, 2015).

Table 1, National Statistics on the 2015 Olympiad for Scientific Creativity

Olympiad Activity	Number
Number of students enrolled in creativity track (Male)	30.283
Number of students enrolled in creativity track (Female)	26.503
Number of students enrolled in scientific research Track (Male)	34.593
Number of students enrolled in scientific research Track (Female)	24.943
Number of schools involved	7.583
Total number of students enrolled in the Olympiad	116.325

2. RESEARCH FRAMEWORK

In a European Cooperation in Education and Training (ECET) project, Pisanu and Menapace, 2014, presented an extensive literature review on creativity and innovation in the educational field. Based on the review of the technical literature, the researchers identified four main key dimensions to enhance creativity and innovation within organizations and to build a practical framework that can serve as guidelines to a better understanding of the creative process that leads to the stabilization of the innovation within educational systems. The four key elements identified are: (a) individual characteristics, (b) organizational structures, (c) training methods and pedagogical practices and (d) training content. These researchers stated that this framework can provide a roadmap to understand and guide the innovation process within organizations. In the present study this model was adopted to build the research framework presented in Figure 1.

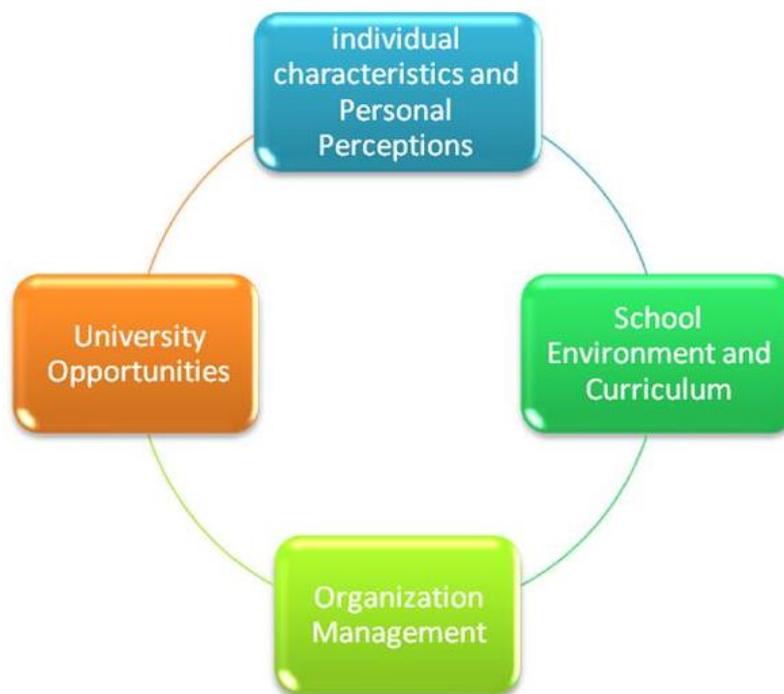


Fig 1, Research framework (Pisanu and Menapace, 2014)

The research questions of this study can be articulated as follows:

RQ1: What are the perceptions of the students about their creativity and innovation skills?

RQ2: How the educational system affects the creativity and innovation skills among students?

RQ3: Does the Official body for creativity and innovation support students in their creativity projects?

RQ4: Does the Saudi university contribute to the enhancement of creativity and innovation skills among students?

3. RESEARCH METHODOLOGY

Based on the above analysis and the literature review a survey questionnaire was designed with the primary objective to assess the creativity and innovation environment from the perspective of gifted students in Hail region, north Saudi Arabia. The design of the survey has undergone different stages and pre-tests which have resulted in eliminating, reclassifying and rephrasing some of the questionnaire elements. The survey uses the five-point Licker's rating scale to measure the different aspects of the subject from the respondent's perspective. The internal consistency of the elements of the questionnaire was measured by the Cronbach's alpha statistic. Content validity of the survey instrument was examined based on expert's reviews from academic institutions. The survey was administered to the study sample population online using web 2.0 technologies (Google Drive) as shown in Fig. 2. It took place at the end of the second semester of study (May 2014), before the final stage of the regional competition. The data was analyzed descriptively (basic statistics were calculated) and qualitatively (the content of the responses to the questions was analyzed).

The questionnaire includes 21 items presented in three sections and general questions about the demographic information (school level, school type, student's specialty, proficiency in English, parents education, family financial level) (9 items). Students were asked about their perceptions on creativity and innovation within the educational system, the organizing body of the National Olympiad on Scientific Creativity, and the opportunities offered by the University of Hail to foster students' creativity and innovation skills. Examples of items include: "I am regularly engaged in creative and innovative type of work", "creativity and innovation skills can be learned at school" and "The Mawhiba management provides necessary support to students." Items were rated on a 5-points Lickert scale (1 =Strongly Disagree, 2 =Disagree, 3 = Unsure, 4 = Agree and 5 = Strongly Agree).

Fig 2, Online Survey Questionnaire (In Arabic Language) <http://cutt.us/ibdaa-2015>

4. RESULTS AND DISCUSSION

4.1. Results Validity

Before engaging in the statistical analysis of the data, internal consistency of the survey instrument was performed by calculating Cronbach's alpha statistical factor. This is an indicator of how well the different items measure the same concept in the survey. In general, reliability coefficients (Cronbach alpha) of 0.70 or greater are considered acceptable and indicate that the survey element is consistent and can give a good measure. The calculated coefficients are shown in Table 2, where Cronbach alpha coefficients are above the value of 0.7 except for the first element measuring the personal perception and attitude towards creativity of the students (equal to 0.524). This can be attributed to the small number of personal questions in this element. The higher values of Cronbach alpha indicate the reliability of the scales in yielding valid results for the purpose of the study.

Table 2, Internal Consistency Cronbach's Alpha Coefficients for the survey elements.

Survey Element	Number of questions	Cronbach's Alpha
individual characteristics and Personal Perceptions on Creativity	5	0.524
School Environment and Curriculum	6	0.738
Organizational Management	5	0.839
University Opportunities	5	0.881

4.2. Respondents Demographic Profile

Since the objective of the present study was to measure creativity and innovation in the educational system in Saudi Arabia from the customers perspectives; these are represented by the gifted students. The respondents consisted of 66 students participating in the last stage of the Olympiad at Hail region before

qualifying to the national competition level. The survey was introduced to the gifted students during a scientific meeting the authors organized to these gifted students and their supervisors during the World Quality week held at the University of Hail on November 2014.

A summary of the profile of the respondents is presented in Table 3. It can be seen from this Table that respondents to the questionnaire are equally distributed between medium (51.52%) and high schools (48.48%), and between the public (both credits (31.82%) and general systems (25.76%)) and private schools (42.42%). This is an indication of the equity between schools and districts of the National Olympiad organizing body, and the managing ministry. 95% of the gifted students participating in the study come from scientific and technical specialties, while only 5% come from religious specialty. This is quite obvious consequence of the lesser focus on scientific and technical subjects in the latter specialty though it is the most prevalent specialty in the Saudi educational system. It has to be stressed here, that the recent reforms undertaken by the government to the educational system focus on scientific and technical topics (Al-Qarni, 2010, and Alamer, 2014). The statistics indicate that the student's English proficiency is important for student to be gifted and creative, since the percentage of respondents with good to excellent English is more than 66%. The educational level of the parents have some impact on student's creativity since 60% of the gifted students have one of their parents being a University graduate, while the financial situation of the family seems to have big effect on the students creativity and giftedness since 91% of the gifted students are from rich or medium families. The authors feel that these statistics give more confidence about the results of the present study on creativity and innovation in the Saudi educational system. Hence, the conclusions that can be drawn from the analysis would contribute in better understanding of the actual situation with regards to innovation and creativity policy adopted by the ministry of education.

Table 3, Profile of the Respondents

Respondents Characteristics	Frequency	Percentage Frequency
Level of School		
Medium School	34	51.52
Higher School	32	48.48
School Type		
Public (Credit hours System)	21	31.82
Public (General Education)	17	25.76
Private	28	42.42
Student's Specialty		
Scientific	37	56.06
Technical	26	39.39
Religious	3	4.55
Student English proficiency		
My English is Excellent	17	25.76
My English is Good	27	40.91
My English is Medium	14	21.21
My English is Poor	8	12.12
Parents Educational Level		
The father or the mother is a university graduate	40	60.61
One of the parents or all of them are higher school	16	24.24
One of the parents or all of them are medium school	3	4.55
One of the parents or all of them are primary school	4	6.06
One of the parents or all of them are illiterate	3	4.55
Family Financial Situation		
Very Rich Family	5	7.58
Rich Family	28	42.42
Medium Family	32	48.48
Poor Family	1	1.52

4.3. Discussion

Creativity and innovation in the Saudi educational system was measured on a five-level scale from the gifted student's perspective. The students made a high assessment of their personal creativity ($M=4.46$, $SD=0.72$) as shown in Fig. 3. The results show that 92% of the students believe in their creativity and innovation skills, and 88% of them are engaged in creative and innovative types of work on a regular basis. 98.5% of the students ascertain that creative and innovative work requires hard work and 72.7% of the students prefer team work rather than individual work.

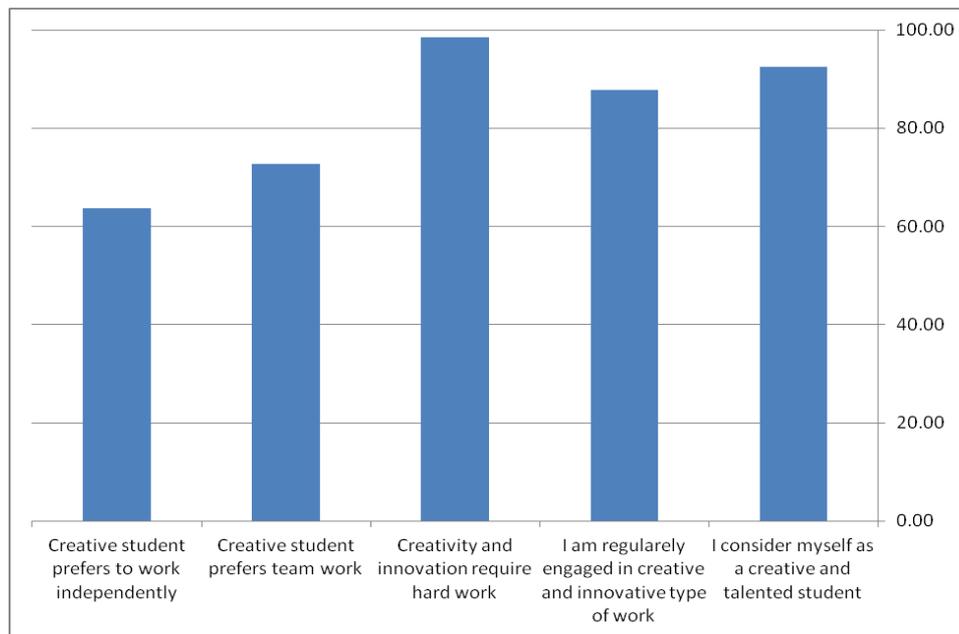


Fig. 3 Students Perception on Creativity and Innovation ($n=66$, $M=4.46$, $SD=0.72$)

As discussed by (Bocconi, Kampylis & Punie, 2012), there is a causal relationship between creativity, innovation and the education system. Educational organizations, from primary to higher education, are considered to be optimal environments for enabling experiences of innovation that learners can transfer to real-life settings through innovative and creative projects. The present results show an agreement between students on the fact that their educational environment, including teachers, schools and the curriculum, contributes positively in fostering their innovative and creativity skills ($M=3.95$, $SD=1.13$). Some discrepancy can be observed from the higher standard deviation within this survey element ($SD=1.13$). The lowest value was recorded for the question "Students in my school recognize the importance of innovation and creativity" where only 38% agreed on that statement (Fig. 4). This indicates that there is lack of awareness on innovation and creativity among school students; this observation was also made by Al-Qarni, 2010, Iqbal, 2011, and Alamer, 2014 in the Saudi educational context.

For the management support students received, referring to financial, technical, technological and even moral aspects, the results are summarized in Fig. 5. It can be seen that, students show strong agreement that the management does provide the necessary support to them during their work on their innovative projects ($M=4.42$, $SD=0.81$). The lowest answer was reported for the statement "Management provides training on creativity tools (Mind map, brainstorming etc..)", where only 72% of the students agreed on that while 28% of them did not agree. In Fig. 6, we summarize the results concerning the student's perception regarding the role the university can play in innovation and creativity enhancement among students. It can be seen from this Figure that more than 50% of the gifted students noticed that there is a lack of training and awareness programs on innovation and creativity by the university. These observations are considered by the research team to be an opportunity to focus on providing training and awareness program to students especially in creativity and innovation tools and techniques such as those described by the American society of Quality in the reference book by (Keathly, Merrill, Owens, Meggarrey, & Posey, 2014). It is worth mentioning here that, as pointed out recently by (Pisanu & Menapace, 2014), the use of creative thinking techniques such as brainstorming, lateral thinking, mind-mapping, six thinking hats technique, morphological analysis, can improve substantially the existing levels of creativity and innovation among individuals in organizations.

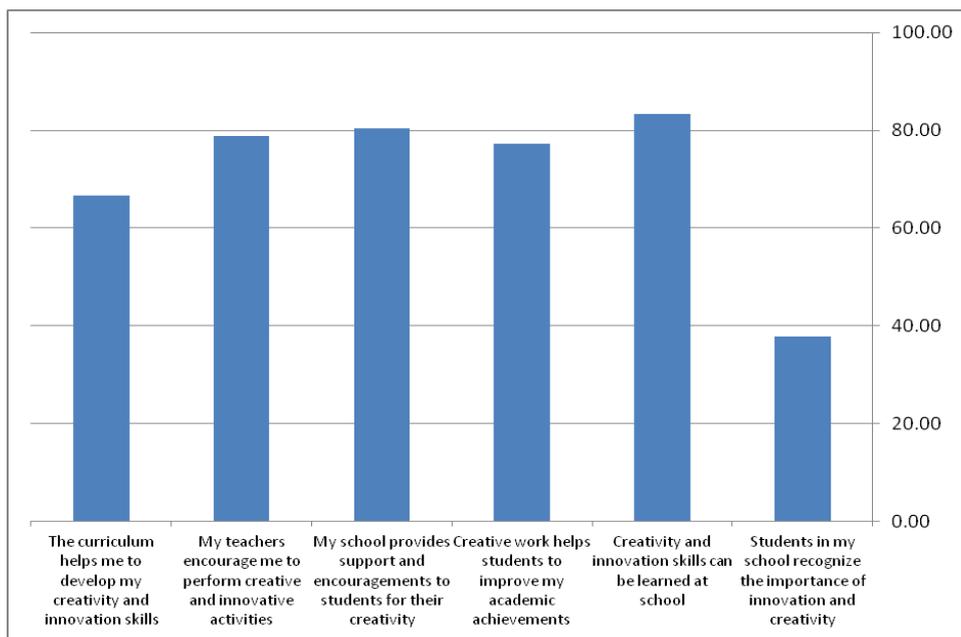


Fig. 4 Students Perception on Creativity and Innovation in the Curriculum (n=66, M=3.95, SD=1.13)

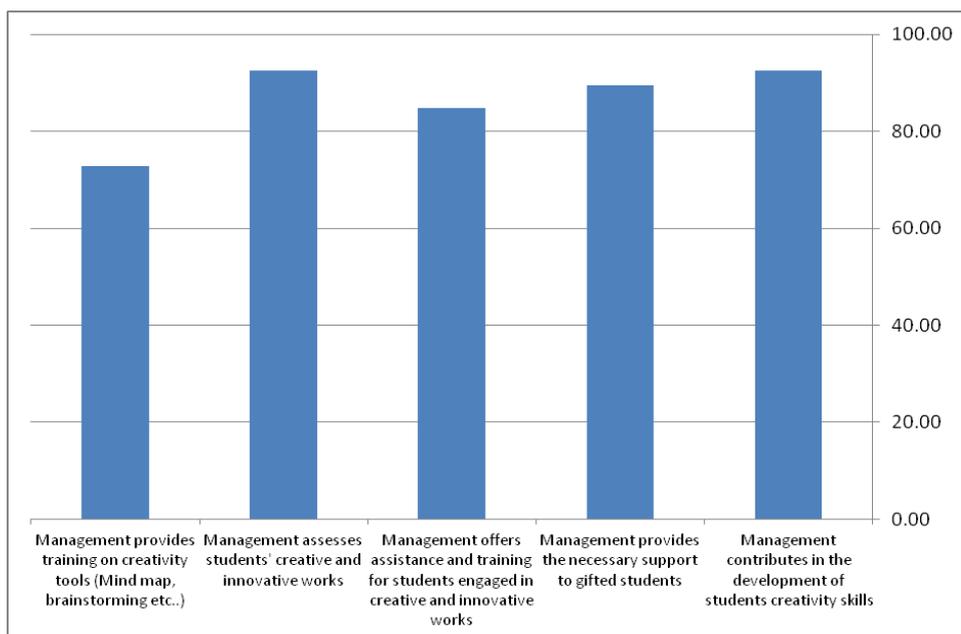


Fig. 5 Students Perception on Management's role in fostering creativity (n=66, M=4.42, SD=0.81)

Limitations of this study include small sample size together with the local aspect. In the present study, we had only 66 male students from Hail region. Future study should cover larger sample spanning over all majors districts, both males and females.

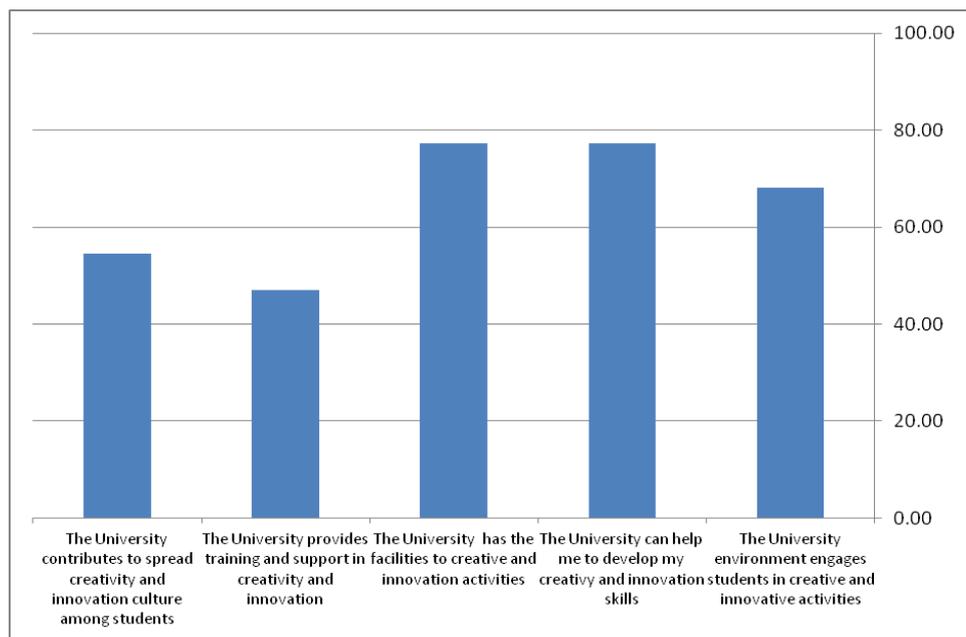


Fig. 6 Students Perception on the University Opportunities (n=66, M=4.01, SD=1.05)

5. CONCLUSIONS AND IMPLICATIONS

The survey questionnaire developed was administered through web 2.0 technologies to Saudi gifted students. The statistical analysis of the results shows positive trends towards the student's perception on creativity and innovation, and highlights opportunities to improve the environment of creativity and innovation within the Saudi educational system.

Some weaknesses of the educational system towards creativity and innovation have been identified. The results highlight a lack of training and awareness programs on innovation and creativity within the educational system at the basic level and the higher education level. This is considered by the research team to be a good opportunity to focus on providing training and awareness programs to students especially in creativity and innovation tools and techniques, such as brainstorming, mind-mapping, six thinking hats technique and morphological analysis. There is no doubt that the use of these creativity thinking techniques can substantially improve the existing levels of creativity and innovation among Saudi students and individuals in organizations.

6. ACKNOWLEDGEMENT

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