Group Creativity in Biomedical Engineering Education

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Abstract

Aim: The present study focuses on a group creativity approach tested during a 5-day interdisciplinary seminar involving 12 members of the teaching team, a creativity facilitator and 87 students from various nationalities enrolled in 4 specialities of a Biomedical Master.

Approach: 15 multidisciplinary teams of 5 to 6 students were formed according to their background and specialities. Questionnaires were used to assess students' thinking styles and teamwork capability. Students were introduced to the six thinking hats technique and to an adapted version of Human Centred Design. During the creativity sessions, students were encouraged to think about things that have frustrated them lately, to find an idea, define what the problem is and "solve" it. The last day, students voted for each project in terms of originality, impact and feasibility. A jury of experts gave a mark (out of 20) to each project.

Results: All the projects involved the development of a smart technical device to diagnose, detect, monitor, cure or prevent a health problem such as diabetes, sleep disorder, sudden death syndrome, snake bite, epilepsy, bed sore, posture or hormonal issues. Jury marks were positively correlated with the peer feasibility and impact votes but not with the originality of the projects. The dominant thinking style of the students was "Pragmatist" (42% of student with score ≥60). The team who received the highest number of votes and the highest jury mark (18 out of 20) included students with different thinking styles (Synthesist, Pragmatist, Realist and Analyst). The 6 teams in which there was at least one member with "Realist" dominant thinking style obtained 63% of peers' feasibility votes. The lowest jury mark (14 out of 20) was awarded to the team including members with only 2 different thinking styles, "Synthesist" and "Idealist". Students with preference for "Synthesist" thinking style perceived their teamwork as less efficient.

Conclusion: The approach used was well received by students and the outcome was very satisfactory. Feasibility and impact are favoured over originality by the students and their mentors. Teamwork seems to be influenced by the diversity of the thinking styles of the teams 'members. The main guidelines developed to improve the teaching of creativity tools concern a) the composition of innovation teams: in addition to the diversity of backgrounds and specialities a more structured approach to form teams should involves measuring team member's thinking preferences before forming a team and balancing it accordingly, b) thinking style awareness: it could be interesting that one identifies each strategic thinking to leverage strengths and to reinforce or modify those thinking styles.

KEYWORDS

Group creativity, Thinking styles, Interdisciplinary teamwork, Biomedical engineering

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1. Introduction

Innovation has become a primary focus in most businesses worldwide and fostering engineers' creativity is critical in product and service design. The *Engineer of 2020* report, by the National Academy of Engineering, starts as follow: « Engineering is a profoundly creative process". Universities are increasingly expected to implement programs that foster and nurture creative problem solving in engineering students to meet business demands (Baillie, 2002). According to Berrett (2013) "Stanford will require all incoming students to take at least one course in « creative expression ». Students at Carnegie Mellon now have to satisfy a "creating" requirement, when they create a painting or a musical composition, or design and build a robot, or develop a creative experimental design. Both the University of Kansas and the City University of New York have recently adopted general education requirements that all students take a course in creative thinking. The University of Kentucky requires all 20,000 undergraduates to take a three-credit course in creativity. The goal in developing students' creative skills, say these institutions, is to train them to look at familiar problems or sets of data and view them from a fresh perspective. »

Yet despite the recognition of the central role of creativity, many Universities are struggling to embrace creativity mainly due to the lack of explicit guidelines to help them embedding creativity in the curriculum and the skills to engage with creativity "intentionally as an outcome of pedagogical work" (McWilliam 2007). Another barrier that explain the failure of Universities to embrace creativity is the assumption that creativity is « a gift that is only possessed by an exceptional few » and is " purely innate capacity that can not be learned" (Wood and Bilsborow, 2014). Researchers are challenging such "myth" by implementing and validating programs that enhance creativity (Baillie, 2002; Brown and Barry, 2011, Latorre et al., 2014; Seidel, 2013; Selig, 2012). Creativity can be defined as the capacity to produce novel, original work that fits with task constraints (Lubart, 1994). It has mainly been investigated from the viewpoint of individuals and relatively few studies have been devoted to understanding collective creativity that engage team members in challenging ways of working and learning.

The present study focuses on a group creativity approach tested during a 5-day interdisciplinary seminar with 87 students enrolled in the final year of a Biomedical Engineering Master (BME- Master). Students were encouraged to use their imagination, divergent and convergent thinking to find a problem, a major obstacle or frustrating technical barrier in biomedical field and come up with solutions to solve it. The aim of this study was to a) assess the role of team composition and dynamic in favouring inspiration and ideas generation and b) develop guidelines to embrace creativity in a postgraduate engineering curriculum.

2. APPROACH

2.1 Participants

A group of 87 students, from various nationalities, enrolled in the second year of a Biomedical Engineering Master (BME-Master) took part in the seminar. The group included 57% males and 43% female with no previous experience of working together. They had wide range of backgrounds: electrical, mechanical, computer & software engineers, doctors, pharmacists, surgeons and health sciences. Students were enrolled in the 4 specialities of the BME Master: BioImaging, BioMaterials, BioMechanics, Molecular and cellular biotherapies, Bioengineering and Innovation in Neurosciences. To bring to the table a wide pool of perspective and diverse knowledge, 15 multidisciplinary teams of 5 to 6 students were formed according to their background and specialities. 12 members of the teaching team (mentors) and a creativity facilitator were involved in the seminar.

2.2 Creative teamwork

The seminar was held in remote area with no Internet access to encourage students to use their imagination and seek information from team members and mentors. The seminar included sport challenges and an evening conference on biomedical innovations.

Prior to starting the creativity sessions, students participated in "warm-up" exercises to adopt a creative mind-set (Selig, 2012). They were then made aware of the creativity blocks (Liu, & Schonwetter 2004) such as: Fear of failure, Fear of the unknown, Frustration avoidance, Reluctance to exert influence, Resource myopia, Reluctance to play. They were introduced to the six thinking hats technique (De Bonno, 1986) and to an adapted version of Human Centred Design principals (HCD), called also design thinking based on the guidelines developed by Stanford University d.school (Brown and Barry, 2011; Latorre et al., 2014; Seidel, 2013; Selig, 2012).

The challenge proposed to students was: “You have just finished your PhD and obtained recently a position as researcher in a stimulating Research & development Lab. The head of the lab asked every team in the lab to come up with an idea or problem to solve and draft a research proposal to apply for Grant funding of 1M€ for a 3-4 year project. Only one project will be selected and proposed to Horizon 2020. This is a unique opportunity for you to finally get your research activity started and you decided to bid on this call with your team.”

During the creativity sessions, the teams’ mission was to find different ideas or problems, select one idea, define what the problem is and “solve” it. They were encouraged to think about things that have frustrated them lately, to consider for example major obstacles, technical barriers or difficulties that healthcare professionals, patients or researchers encounter. Each team members had to come up with one idea of problem and share it with the rest of the team. Then the team had to select the best idea or problem to solve and spent 3 days imagining innovative technical solutions, writing a research project to validate theses solutions and biding on a call for funding.

At each stage of the creative process, students received guidelines on how to find and define a problem, brainstorm, sketch and test their ideas. The emphasis was put on how important it is to differ judgement during the brainstorming phase and ask for feedback from mentors and peers. A workbook was handed to each team to guide them during the five iterative stages of the creative process: Need finding, Problem definition, Brainstorming, “Building” and Testing.

The final day was dedicated to the oral defence of the projects in front of their peers and a jury of experts (including mentors). Students voted for each project in terms of originality, impact and feasibility and the jury gave a mark (out of 20) to each project.

2.3 Questionnaires

Questionnaires were used to assess students’ thinking styles and teamwork. The Inquiry Mode Questionnaire (*InQ*) attempts to measure the characteristic thinking style of individuals on five major dimensions: Synthesist, Idealist, Analyst, Realist, and Pragmatist. Developed by Harrison and Bramson in 1977 (Bruvold et al., 1983), the *InQ* includes a set of 18 statements with forced, 5 multiple-choice responses designed to determine the subject's mode of thinking not some aspect of personality. High scores (≥60) showed where the thinking preferences lie. These thinking strategies have been learned over time, and were used because they work well for the person. Low scores (<48), identifies the areas of strategic thinking that are under-used or under-developed. The lower the score, the greater the tendency not to use a style.

Teamwork was assessed using two questionnaires: team competencies (Burrell, 2000) at the beginning of the seminar and teamwork survey by the end of the seminar (Tuckman 1965; Clark 2004). Team competencies questionnaire included 10 competencies to rank according to the level of proficiency (1 not at all proficient - 5 extremely proficient) and students were invited to determine the 3 areas (from the 10 competencies) that they most would like to develop further. Teamwork survey questionnaire contains 32 statements about teamwork to identify the present stage of the teamwork model where a team is presently operating. It is based on the "Tuckman" model of Forming, Storming, Norming, and Performing. Tuckman (1965) suggested that these phases are all necessary and inevitable in order for the team to grow, to face up to challenges, to tackle problems, to find solutions, to plan work, and to deliver results (Clark 2004). Next to each question, participant indicated how often their team displayed each behaviour by using the following scoring system: Almost never: 1 / Seldom: 2 / Occasionally: 3 / Frequently: 4 / Almost always: 5. A score was calculated for each of the 4 stages. The lowest score possible for a stage is 8 (Almost never) while the highest score possible for a stage is 40 (Almost always). The highest of the four scores indicates which stage a member perceive where his team was operating.

3. Results

3.1 Feedback

Students were very satisfied with the seminar, its outcome and the relationships with their mentors and peers. Their comments were positive in general and they wished the seminar had lasted longer. The atmosphere was relaxed and friendly even though the schedule was very busy and fast paced. They found it very challenging and rewarding to work with team members from diverse backgrounds and strong personalities and egos. Their comments suggested that it was difficult to deal with conflicts, to move outside their habitual thinking style, to reserve judgement when someone suggested an idea and to continue generating ideas even when a viable one was found. Some students expressed the need for more creativity training to overcome the creativity blocks. They emphasised the importance of having frequent similar multidisciplinary projects all over the year as weel as meeting and learning from biomedical and health entrepreneurs. The main criticism concerned a) the feedback of the mentors, which was sometimes judgemental or contradictory and b) the length of the questionnaires made it difficult to be completed by all students because of the busy schedule of the seminar: 79%, 76% and 54% of students completed team competencies, thinking styles and teamwork survey questionnaires respectively.

3.2 Outcome

Each of the 15 teams managed to write a research project and defend it on the final day. All the projects involved the development of a smart technical device to diagnose, detect, monitor, cure or prevent an existing health problem such as diabetes, sleep disorder, sudden death syndrome, snake bite, epilepsy, bed sore, posture or hormonal issues.

Peers votes and jury marks are presented in table 1. There was great variability between teams in terms of the number of peers' votes. For example, some teams obtained no vote for impact or feasibility while others were far above the average vote as suggested by the maximum of peers' votes. Jury marks were between 14 and 18 out of 20. Correlations analysis (table 2) showed positive correlations between impact and feasibility but no significant link was found with originality. Jury marks were positively correlated with peers' feasibility and impact votes but not with peers' originality votes.

The best two teams that received the highest jury marks (18 and 17 out 20) and the highest total of peers' votes (39 and 36) presented opposite profiles for the distribution votes: Team 1 (39 votes and 18/20) received the highest number of feasibility and impact votes (18 and 14 respectively) while Team 2 (36 votes and 17/20) was awarded with the highest number of originality votes (26).

Table 1: Descriptive statistics of peers votes (Originality, Impact, Feasibility) and jury marks. SD: standard deviation. (n=15 teams)

	Originality	Impact	Feasibility	Total votes	Jury Mark (/20)
Average	5.8	5.8	5.8	17.5	16
SD	6.3	4.3	4.9	10.0	1.4
median	4	5	4	16	15
min	1	0	0	6	14
max	26	14	18	39	18

Table 2: Correlation between peers' votes and jury marks. Only significant correlations are presented. (r: Pearson Correlation; p: Sig. (2-tailed))

		1	2	3	4	5
1 Originality	r	1				
	p	.				
2 Impact	r		1			
	p		.			
3 Feasibility	r		0.42	1		
	p		<.001	.		
4 Total votes	r	0.63	0.64	0.67	1	
	p	<.001	<.001	<.001	.	
5 Jury Mark	r		0.27	0.41	0.43	1
	p		0.01	<.001	<.001	<.001

3.3 Thinking styles

The InQ measures the extent to which a person uses each of five styles, highlighting the strengths and limitations of each. Table 3 shows that the dominant thinking style of the students was "Pragmatist" with 42% of students with score ≥60 and 53% with score between 59 and 49. According to the authors of the InQ, "Pragmatists are likely to be good at knowing what people will "buy." They can afford to approach problems in innovative or compromising ways because they have no vested interests in particular theories or methods. They provide optimism and enthusiasm that motivates people to move ahead even when the task seems mountainous. Because they don't need to take on the whole world at once, Pragmatists often have a high tolerance for ambiguity. They need less structure and predictability than the rest of us"

At the second rank, Analyst and Synthesist thinking styles were equally preferred or used by students. Analysts « see the world as structured, organized, and predictable…they believe there should be one best method for doing anything; their style is prescriptive and method-oriented». Synthesists focus «their thinking on ideas and find connections among things that other people see as having little or no relationship; their style is challenging, speculative, integrative, and process-oriented ».

The two « underused » thinking styles were Idealist and Realist. Idealist « experience reality as the whole into which new data are assimilated, based on perceived similarities to things they already know; their style is assimilative, receptive, and need-oriented. "Idealists look and respond attentively and receptively. They show a supportive, open smile. They do a great deal of head-nodding. They give verbal and nonverbal feedback that serves to encourage you to be open with them, to trust them, to see them as helpful and receptive ». Realist are « inductive, whose mental modes are derived chiefly from observation and their own experiences; their style is empirical and task-oriented ».

Although more than half of our participants (55%) scored 60 and above in just one style, 29% participants showed a preference for using two thinking styles in combinations (high score for both styles ≥60). Few participants (17%) showed a level profile in which all scores fall below 60; They tend to look at things differently, depending on the situation.

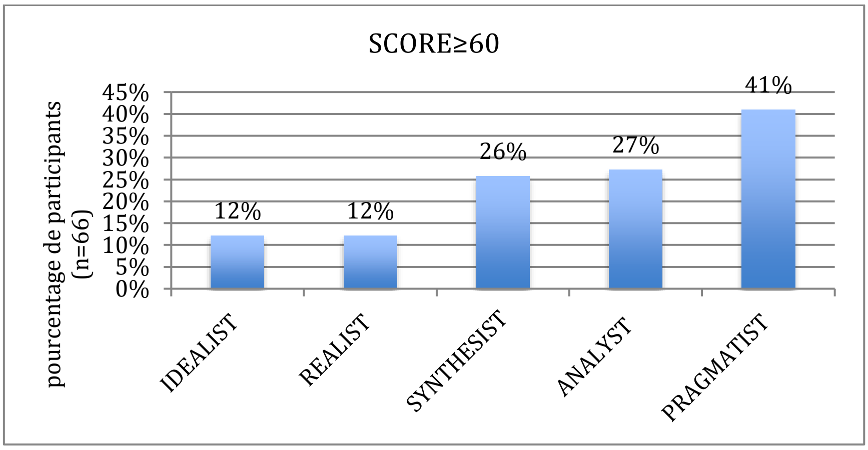

Figure 1: Dominant thinking styles of the BME Master students. Frequency of high scores (≥60) per thinking style. (n=66)

The team who received the highest number of votes and the highest jury mark (18 out of 20) included different thinking styles members with high score (≥60) for Synthesist (2 members), Pragmatist, Realist (2 members) and Analyst. The lowest jury mark (14 out of 20) was awarded to the team including members with only 2 different thinking styles, Synthesist and Idealist. The team that was awarded the highest number of originality votes included members with high scores for Idealist, pragmatist and Analyst and low score (48) for Realist and Synthetist thinking styles. The 6 teams in which there was at least one member with Realist dominant thinking style obtained 63% of peers' feasibility votes.

In order to further investigate the link between the five thinking styles and the performance of the 15 teams, two groups were created, high- and low- performance teams, according to the median of the number of peers' votes. The high and low performance teams were respectively above (>16) and below (≤16) the median of the total votes. Figure 3 shows that high performance teams included members from different thinking styles such as Pragmatist, Realist, Idealist and Analyst. Compared to high performance teams, low performance teams' members showed higher score for only one thinking style, Synthesist.

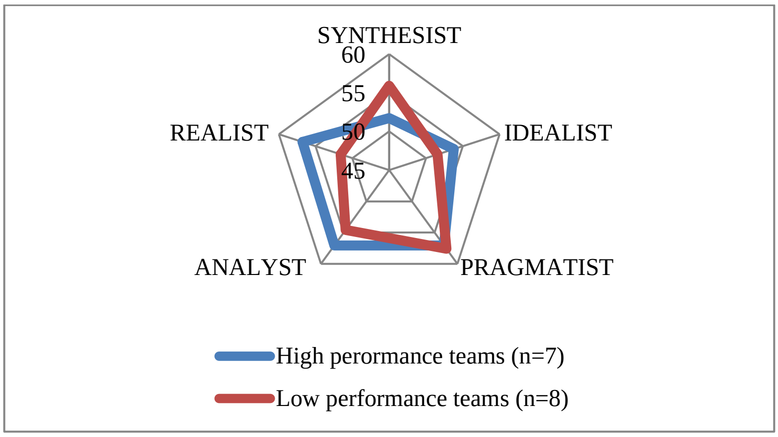

Figure 2: Thinking style profiles of high and low performance teams. The high and low performance teams were respectively above (>16) and low below (≤16) the median of the total votes.

3.4 Team competencies

The 3 main team competencies that the majority of students (table 3) possessed were a) Ability to understand cultural and gender differences and integrate these differences into the team organization, b) Ability to be open minded when others disagree with my opinion and c) Ability to remain clear and focused when organizing a project.

On average, the 3 team competencies that students felt the least proficient in and would like to develop further (table 3) were a) the ability to negotiate successfully, b) the ability to deal with conflict and c) the ability to hold others attention through active listening and expressing my ideas clearly and logically.

Inter-individual differences in terms of team competencies were related to thinking styles. Indeed, correlation analysis (table4), showed that a high score in Idealist thinking style was significantly and positively linked to different competencies such as the Ability to “remain clear and focused when organizing a project”, the “Ability to be confident”, the “Ability to deal with conflict” and the “Ability to hold others attention through active listening and expressing my ideas clearly and logically”. However, Idealists seemed less proficient in their “Ability to be non-judgemental” as suggested by the negative correlation. Students with dominant Analyst thinking style expressed less proficiency in the “Ability to delegate tasks” and the “Ability to remain clear and focused when organizing a project”. Finally, Realist dominant thinking style students are more proficient in the “Ability to understand cultural and gender differences and integrate these differences into the team organization”.

Table 3: Team competencies (n=69). What Team Competencies do you possess? Rank according to proficiency : 1 not at all proficient - 5 extremely proficient. SD : Standard Deviation.

	Average	SD
5. Ability to understand cultural and gender differences and integrate these differences into the team organization.	3.97	0.95
3. Ability to be open minded when others disagree with my opinion.	3.78	0.86
1. Ability to remain clear and focused when organizing a project.	3.75	0.85
6. Ability to delegate tasks.	3.67	0.93
9. Ability to lead a group during conflict and times of cohesiveness.	3.41	0.93
2. Ability to be non-judgemental.	3.39	0.97
4. Ability to be confident.	3.39	1.07
7. Ability to deal with conflict.	3.38	0.96
10. Ability to hold others attention through active listening and expressing my ideas clearly and logically.	3.38	1.00
8. Ability to negotiate successfully.	3.35	0.88

Table 4: Correlations between thinking styles and team competencies (1 to 10; see table 3). Only significant correlations are presented. (r: Pearson Correlation; p: Sig. (2-tailed))

		1	2	4	5	6	7	10
IDEALIST	r	0.29	-0.29	0.41			0.29	0.33
	p	0.02	0.02	0.00			0.02	0.01
ANALYST	r	-0.26				-0.25		
	p	0.04				0.05		
REALIST	r				0.28			
	p				0.03			

3.5 Team development

The teamwork survey questionnaire helps assess in what stage the team operated. It is based on the Tuckman Model of Forming, Storming, Norming, and Performing. Gradually, the team moves from one stage to another. According to Clark (2004), "The forming stage, takes place when the team first meets each other. In this first meeting, team members are introduced to each other. They share information about their backgrounds, interests and experience and form first impressions of each other. Most team members are positive and polite. Some are anxious, as they have not fully understood what work the team will do. Others are simply excited about the task ahead Then, Storming often starts where there is a conflict between team members' natural working styles. Norming is when people start to resolve their differences, appreciate colleagues' strengths. Now that the team members know one-another better, they may socialize together, and they are able to ask each other for help and provide constructive feedback. People develop a stronger commitment to the team goal, and you start to see good progress towards it. The team reaches the performing stage when « hard work leads, without friction, to the achievement of the team's goal."

By the end of the seminar, most teams reached the Performing stage. On average the highest score was observed in the Performing stage however some teams were still in the initial stages of team development by the end of the seminar (figure 3). Correlation analysis between teamwork stage and teamwork compentencies indicated that teams that operated in Storming stage at the end the seminar had lower proficiency in team competencies such as the "Ability to be open minded when others disagree with my opinion" (r=-.31; p=.04) and the "Ability to deal with conflict" (r=-.37; p=.01). On the contrary, teams that reach the Performing stage showed high "Ability to deal with conflict" (r=+.33; p=.02).

Correlation analysis between thinking styles and teamwork stages showed two significant positive correlations. The first was a relation between Storming and Synthesist scores (r=+.32; p=.03) which, suggest that team members with high score for Synthesist thinking style are more likely to perceive their team as operating on Storming stage. The second positive correlation is between Idealist thinking style and Performing stage (r=+.34; p=.02); this could be linked to their high proficiency in team competencies.

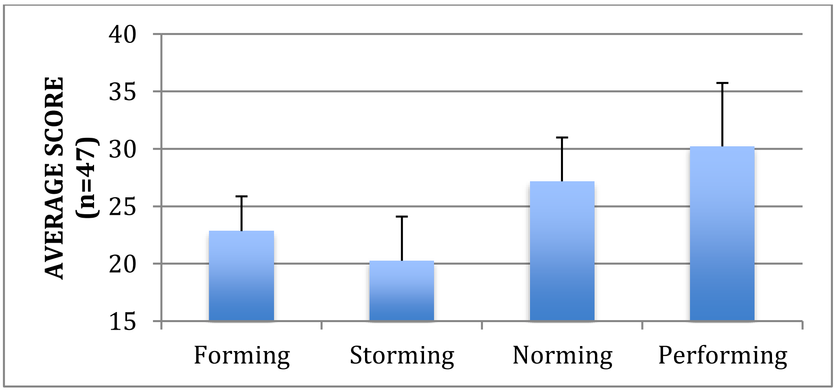

Figure 3: The highest of the four scores indicates which stage you perceive your team to normally operates in. The lowest score possible for a stage is 8 (Almost never) while the highest score possible for a stage is 40 (Almost always). (n=47)

4. CONCLUSIONS

In this paper, we have reported the results of the thinking styles, team competencies and team development during group creativity seminar involving postgraduate students enrolled in a Biomedical Engineering-Master. All our participants are accustomed to achieving on their own academic merit but during the seminar they find themselves in a situation where their individual success was strongly reliant on teamwork members with a large expertise dissimilarity. They are used to work successfully under time constrained and solve well-defined problems while the new experience of creative teamwork in a fast-paced seminar made them aware of the need to develop new skills such as the ability to communicate effectively, manage relationships and overcome the creativity blocks such as the fear of failure, fear of the unknown, frustration avoidance.

The results showed that a large percentage of students had peak in Pragmatist thinking style followed by Analyst and Synthesist. Although this results need to be confirmed on large sample, one can wonder whether these thinking styles are part of a "professional or educational culture" shared by Biomedical engineering students which is different from general population or other professional communities. Indeed, previous researches indicated that a) the three most common thinking styles in the United States' general population are Idealist, Analyst, and Realist (Harrison and Bramson, 1982) and b) information technology executives from the United States scored high in the idealist and pragmatist styles (Delisi and Danielson, 2002).
In our study, all teams succeeded in finding a problem or a challenge and developing a quality research project to solve it in very limited time and with few resources. They might have benefited from the "bias for action " of their Pragmatist team members. These individuals like to get things done and their approach is often flexible and adaptive. The model of the pragmatist is, "whatever works." Research showed that many CEOs tend to be dominant in the pragmatist style (Bramson et al.1985). In a recent study, Post (2012) found that how people think can impact, positively or negatively, the innovation of a team. Post, who surveyed innovation teams – teams working on product, process and service innovation – at 83 large U.S. industries, found that team members' thinking styles indirectly influence team innovation by shaping teams' interpersonal dynamics. Post considered that "there is an assumption among managers that diversity of knowledge improves innovation, but that's only a starting point…You also must consider team members' thinking styles…it is important for managers forming innovation teams to consider not only the functional knowledge, but also the thinking styles that individuals bring to the team". The findings of our study support the idea that the variety of the thinking styles within a team favours the team performance. Indeed, high performance teams included members from different thinking styles such as Pragmatist, Realist, Idealist and Analyst. Realist thinking style seemed to favour feasibility and idealist could lead to more originality. However, these initial results need to be confirmed because 20% of the students did not complete the thinking and as Johnson and Christensen (2004) stated, "others may not have the insight into their own behaviour or thinking to answer a question in a way that will accurately communicate information about them". Despite these limitations of self-reporting questionnaires, a deeper awareness and understanding of the attitudes and behaviours is crucial for effective team work. Special edition of Learning and Individual Differences (Editorial, 2011) calls for more styles research and clear guidance on how to effectively apply styles research to educational practice in higher education as well as workplace settings.

Students' feedback emphasised the need to reach a broader consensus among mentors (which are from different backgrounds: professors in medicine or engineering) as to their embracing the creativity principles. The mentoring role should shift toward a facilitating role. This not an easy change because the mentors are members of the teaching team with dissimilar expertise and strong culture of excellence that lead to penalising mistakes which in turn can block creativity and risk taking. This is probably one of the many reasons why feasibility and impact are favoured over originality by students and their mentors. The facilitator role involve the ability to be non-judgemental and perceive mistake "as opportunities for, and proof of, learning instead of failure…to change the paradigm to one that is more enabling and valuing of creative effort" (Jackson, 2006). According to Baillie, "facilitators need to be outside the process and not involved in the debate and must relinquish control – one of the hardest qualities for a teacher! It is best to move around the space and make it seem effortless – make people feel special and empowered – yet grounded ».

The main guidelines developed to embrace creativity in the curriculum concern a) a frequent **multidisciplinary**

teamwork: this unique opportunity to work in multidisciplinary teams was seen as not enough to set the foundation for a strong community for the rest of the year and to develop the skills need for teamwork and creativity. Students demanded the implementation of a frequent similar experience and learning from health and biomedical entrepreneurs and suggested that a multidisciplinary curriculum should not only include a learning through participating or "sharing" the same lectures but also a multidisciplinary group project learning. These involve a shift in the teaching culture and changes in the structure and the curriculum to help students teams to carry their ideas from conception to possible market adoption, b) **train the trainers**: a creativity training is under development for the mentors to bring them to shift, for the purpose of the seminar, from their usual teaching role where they transfer knowledge and sense making through structured lectures and controlled assessment to a facilitator role, c) **composition of innovation teams**: in addition to the diversity of backgrounds and specialities a more structured approach to form teams will be adopted that involves measuring team member's thinking preferences before forming a team and balancing it accordingly whenever possible, d) **thinking style awareness** : It has been decided to ask students to complete the questionnaire on thinking style before the seminar to identifies each strategic thinking that he or she over- or under-uses and become aware of the strengths and limitations of these thinking styles as well as the ways to augment or modify those styles. Harrison and Bramson (1984) provide detailed suggestions on how to communicate with those who think the same as you and those who think differently than you and how to reinforce the five thinking styles.

We hope that the improvements planned for the next seminar would help to build constructive relationships between students and with tutors and open the door to enhanced group creativity in problem solving. The personal and interpersonal skills developed during the seminar would be one of its short-term benefits and a small step in health science innovation long roadmap.

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