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Fostering Team Creativity in Higher Education Settings

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ABSTRACT

This paper examines how team creativity can be developed using the Synectics creative problem-solving approach by taking stickiness into account. Stickiness represents the difficulty learners experience in internalising knowledge and skills to perform a task productively. Using a quasi-experimental design learners' perceived change in team creativity was assessed over three months. The findings indicate that team creativity is enhanced using the Synectics approach, overcoming many stickiness challenges. Significant improvements were observed for team creative skills immediately after the workshops and remained three months later. The study's findings add to knowledge of how creativity can be enhanced in teams overcoming inhibitors and suggesting that teams benefit from developing their team creative skills which favour problem-solving, novel ideas and innovation. Synectics, as a team creative problem-solving approach, can be used successfully to stimulate creativity in higher education contexts. Implications for theory and management educators are discussed.

Keywords: Team Creativity; Creative skills; Stickiness; Skills Development.

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Introduction

Management educators have been criticised for inadequately preparing graduates for a rapidly changing future world of work, where there is a growing need for adaptable, creative workers who have the ability to productively integrate in a changing labour market of contract, part-time and self-employment opportunities (Autor, 2010; Bridgstock, 2009). In a globally-connected world, surrounded by smart machines and systems, novel and adaptive thinking is a critical future skill. However Baker and Baker (2012) warn that too many business schools do not regard it as their responsibility to develop novel thinking skills in graduates. They urge management educators to examine their current classroom practice, curriculum and learning goals to determine whether these settings inspire creativity.

Novel and adaptive thinking requires creativity, as it involves proficiency at thinking and coming up with solutions and responses beyond that which is rote or rule-based (Davies, Fidler and Gorbis, 2011:9). As such creativity is a crucial graduate attribute relevant for problem-solving, generating novel solutions, innovation (Baker and Baker, 2012) and leading teams (Adler, 2006). Well-known creativity scholar Amabile (1996) views creativity is a multi-dimensional concept and an innate ability that everyone is born with, yet can be enhanced through educational interventions. While individual creativity provides the basis for team and enterprise innovation (Hirst et al., 2009); developing creativity in teams can be challenging (Walton, 2003). Too often business education tends to overemphasise individual linear, rational skills embedded in the scientific paradigm (Chia, 1996; Hoover et al., 2010) at the expense of intuition and team creative skills (Bennis and O'Toole, 2005; Ghoshal, 2005).

Public universities' funding are partially contingent upon delivering 'work ready' graduates, particularly in the UK, Canada and Australia (Brigstock, 2009). As such management educators tend to focus on career based outcomes, deliver content-dominant curricula, focusing on grades as performance outcomes (Baker and Baker, 2012). While team work and collaboration is seen as important graduate attributes, only a few courses address this, due to the time-consuming nature and student resistance (Curtis and McKenzie, 2002). Therefore enhancing team creativity through an educational intervention is challenging. Team creativity requires a supportive climate that supports risk-taking and nurtures new ideas and knowledge that emerge from intricate team processes (Blackman and Benson, 2010). Furthermore developing team creativity requires a maturation process and reinforcement over time. Earlier research predominantly focuses on individual creativity and its antecedents (Mathisen and Bronnick, 2009; Robbins and Kegley, 2010), while only a limited number of studies focus on team creativity (Gilson and Shalley, 2004; Taggar, 2002; Hirst et al., 2009).

In this paper team creative skills development is examined through stickiness stages, using the Synectics approach. Stickiness refers to the difficulty learners have to internalise knowledge and skills, enabling them to perform a task successfully (Szulanski, 2000). Stickiness is applied as a theoretical lens to team creativity to understand where difficulties occur during the development process. The contribution of this article is threefold. Firstly a more nuanced understanding of team creative skills is provided showing how teamwork, problem-solving skills and supportive communication contributes to creativity through stickiness stages. This study responds to recent calls in management education research to develop creativity among business school graduates (Baker and Baker, 2012). Secondly this paper shows that Synectics is an effective process to develop creative skills, since it overcomes barriers to learning. The Synectics process views creativity as multi-dimensional, providing guidelines for individuals to function as productive team members. Breaking down creative skills into smaller subsets provide a more fine-grained analysis of the different

types of creative skills effective teams should cultivate, rather than studying creativity as a uni-dimensional variable (Lourenço and Jayawarna, 2011). Finally on methodological level skill development is assessed over time, conducting multiple measurements at different time intervals. Investing in creativity development is of little use to management educators unless the effects endure over time. Therefore these findings help elucidate a richer understanding of the development of team creative skills. Moreover this is potentially valuable to managers and educators, who place considerable emphasis on creative action, not only in the area problem-solving, but also in innovation (Tsai, 2001) and enterprising behaviour (Lourenço and Jayawarna, 2011).

In the next section creativity and team creative skills are discussed, then the impact of stickiness stages on creative skills development is explored, there-after the method and results are presented and the paper concludes with a discussion of the findings, implications, limitations and future research directions.

Literature Review

Defining creativity and the creative process

Creativity is a process that leads to artefacts or ideas that are novel, appropriate and valuable to society (Baker and Baker, 2012; Amabile, 1996). Although individuals can independently generate and produce creative products, organizations are increasingly relying on teams to develop and implement innovative initiatives, requiring creativity and collaboration (Kennedy, Loughry, Kammer & Bayerlein, 2009; Paulus, Levine, Brown, Minai & Doboloi, 2010). Organizations find it challenging to institutionalize creativity. One of the reasons for this is the context-specific nature of the environment in which creativity occurs (Shalley & Gilson, 2004), making creative skills 'sticky' or difficult to transfer to other contexts, since creative action can be hindered by a barren organizational climate.

Most creativity models acknowledge that the creative process consists of divergent and convergent stages (Amabile, 1996; Fills and Rentschler, 2010). Divergent thinking utilises associative thought patterns and facilitates the generation of incongruent, loosely-connected ideas (Ashton-James and Chartrand, 2009); while convergent thinking uses mental categories, enabling people to see similarities and patterns between seemingly disparate pieces of information (Cropley, 2006). The value of an explorative mindset for managers has been shown empirically (Hirst et al., 2009). These thinking processes, supported by team creative skills, are essential to the creative problem-solving process (Shalley and Gilson, 2004; Walton, 2003).

Team Creative skills

Teams are composed of interdependent individuals with common tasks. Since creativity is often enacted in team settings, teamwork, problem-solving and supportive communication skills are crucial to enhance the creative process (Taggar, 2002; Hirst et al., 2009; Walton, 2003).

Teamwork influences team creative performance. Three major social factors tend to inhibit idea generation in teams. First, competition for speaking time in face-to-face groups limits individuals' opportunities to express ideas (Paulus et al., 2010). Second, uncertainty and the psychological risk of idea rejection may limit participation (Mumford, 2000). Third, passive team members may influence others to decrease their performance (matching), resulting in low group performance norms (Paulus et al., 2010) increasing stickiness. Supportive social processes such as support for creativity, risk-taking, teamwork and tolerance of mistakes, enhance team performance (Kennedy et al., 2009). Collaborative work processes involve balanced

contributions of members, mutual support, effort and cohesion (Hoegl and Gemuenden, 2001). However Taggar (2002) warns that groups who are inadequately trained in team creative processes can stifle innovation. Behaviours such as willingness to change perspectives, receiving suggestions from team members, evaluating ideas positively and listening to others; foster teamwork (Kennedy et al., 2009; Hirst et al., 2009) and decrease stickiness or difficulties in internalising these skills and knowledge.

Problem-solving skills in teams can enhance team performance, strengthen cohesion and be very rewarding for members (Amabile, 1996; Taggar, 2002), provided social challenges are addressed. Members read contextual cues from team members, such as reactions to ideas, which guide behaviour. This non-verbal feedback is construed as rewards or criticisms; and members will exhibit reward-seeking or avoidance behaviours (Hirst et al., 2009). Supportive problem solving-behaviours reduce the psychological risks associated with such uncertainty. Structured creative problem-solving processes, such as Synectics, reduce ambiguities and increase positive responses among team members (Rock, 2008; De Villiers Scheepers, 2011).

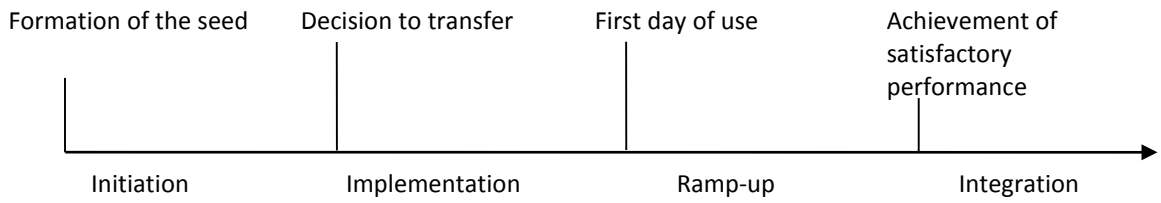
Nolan and Williams (2010) describe Synectics as a process of innovation articulated in the form of practical tools and application models. Synectics facilitates a creative climate through supportive behaviour, stimulates creative thinking using tools to generate new ideas and focuses on creative action which drives idea implementation. The group leader and team members' behaviours contribute to sense making and joint problem-solving (Taggar, 2002). Implementing novel ideas is inherently difficult and can be very time consuming (Mumford, 2000), thus appropriate time management behaviours are essential (Mumford, 2000). Creative problem-solving skills are therefore a function of problem-solving ability, effective use of time, motivation and management and a focus on action implementation.

Supportive communication and feedback reduce the chances of knowledge losses and facilitate creativity through associative thinking resulting in knowledge creation and new thinking (Robbins and Kegley, 2010). Hoegl and Gemuenden (2001) find that teams' performance improves when relevant information is shared, deepening team relations and trust. Trust involves a willingness to be vulnerable based on confidence in the positive expectations of others' intentions or behaviours, accepting influence and sharing information (Lee et al., 2010). In uncertain situations trust and knowledge of the creative process facilitate participation, supporting the expression of novel ideas, without fear of ridicule (Sommer and Pearson, 2007). Therefore supportive communication manifests in synthesizing the team's ideas, participation, providing constructive feedback (Taggar, 2002), gaining and building trust while motivating others, building consensus (Sommer and Pearson, 2007) and assertive communication. These behaviours contribute to a psychologically safe climate for creativity.

Stickiness stages and creative skills development

Stickiness refers to the difficulty learners have to internalise knowledge and skills, enabling them to perform a task successfully (Szulanski, 2000). When learning a creative problem-solving process like Synectics, participants find it challenging to change established behavioural routines, moderate their own and others' behaviours and deal with the ambiguity of the process. Therefore educational interventions should be designed to accommodate the stickiness stages learners move through as they develop team creative skills. Szulanski (2000) identify four stickiness stages which impact the different stages of the creative skills development process. The four stages are initiation, implementation, ramp-up and integration, as shown in Figure 1.

Figure 1:
Four stages of stickiness in the creative development process



Source: Adapted from Szulanski (2000)

Initiation stickiness

Initiation stickiness is the difficulty in recognising opportunities for change and acting upon them. When a lack of creative skills is identified, an opportunity for development exists, triggering a search for solutions (Szulanski, 2000). Determining exactly what the skills development should achieve is ambiguous (Blackman and Benson, 2010). Uncertainty can be reduced by contextualising knowledge for the team, showing its value and emphasizing the credibility of the source (Szulanski, 2000). Team creative skills should be assessed during this phase to provide a benchmark for comparison after the creativity skills development process.

Stickiness influences creative skills development and is linked to the team's motivation and confidence of their knowledge in this area. Innovative individuals often overestimate their general knowledge and abilities, indicative of overconfidence (Simon and Schrader, 2012). Overconfidence, also called hubris, refers to gratuitous, elevated self-assurance, where a person's confidence is higher than subsequent events bear out (Bhandari and Deaves, 2006). So it is only in retrospect, after knowledge and outcomes are measured that actual hubris can be determined (Forster and Sarasvathy, 2007). Overconfidence is influenced by the complexity of the task, uncertainty of a situation (Hayward et al., 2006), and is positively correlated with education and maleness (Bhandari and Deaves, 2006). Participant hubris may lead to a higher skills assessment, than actual skills levels, especially for male students with previous education and knowledge of creativity (Forster and Sarasvathy, 2007). Thus, it can be proposed that:

> *Hypothesis 1:* Participants assessment of their team creative skills (teamwork, problem-solving and communication) will be more favourable during the initiation stage, compared to reflection at the integration stage).
>
> *Hypothesis 2:* Male students, who have previous education in creativity, assess their team creative skills (teamwork, problem-solving and communication) more favourably than other participants.

Implementation and Ramp-up stickiness

The implementation stage focuses on information and resource exchange between the facilitator and participants. Information flows peak during this time as the relationship develops. Therefore participants often assess their skills favourably straight after an event (Mathisen and Bronwick, 2009). Challenges arising during this stage include identifying communication gaps; building on recipients' previous knowledge; gaining time commitment; and clarifying the roles and responsibilities of both parties. While planning may reduce some uncertainties, the relationship and attitudes of the facilitator and participants also influence stickiness during this stage.

During the ramp-up stage the main concern becomes identifying and resolving performance, after the development process. The ramp-up stage offers a short period where unexpected problems can be resolved and team members are likely to use new skills ineffectively, ramping-up gradually toward satisfactory performance, often with external assistance (Elwyn et al., 2007). Therefore interventions should give team members an opportunity to practice their newly acquired skills. The facilitator can then observe and clarify unexpected problems that arise. Stickiness may result from applying new knowledge in an unsupportive environment and adapting new skills to fit with a dysfunctional way of working (Blackman and Benson, 2010). It is hypothesized that:

> *Hypothesis 3:* Team creative skills (teamwork, problem-solving and communication) will be highest after the implementation and ramp-up stages.

Integration stickiness

When the use of new knowledge and skills become a habit at the integration stage, the development process is successful. Therefore creativity skills and practices should be assessed after some time has passed, for example three months. This period is sufficient to develop social patterns within teams (Elwyn et al., 2007). When all goes well new practices intermingle with the objective reality of the organization; however when problems are encountered new skills could be discarded and if feasible, a transposition to the former status quo may occur. Stickiness may result from unresolved obstacles or resistance to new knowledge and practices (Szulanski, 2000). Creative skills are particularly vulnerable in an unsupportive team climate (Shalley and Gilson, 2004). Some losses (stickiness) are expected over time, therefore it is hypothesized:

> *Hypothesis 4:* Team creative skills (teamwork, problem-solving and communication) will decline after the integration stage.

Method

A quasi experimental research design was used to determine the development and retention of team creative skills over stickiness stages using the Synectics approach. While a full experimental design was initially envisaged, attrition of the control group became problematic after the three month period as participation was voluntary. However no significant differences were found in demographic variables or academic performance of students enrolled in the same course who participated in the workshop, compared to students who did not participate.

Sample

Data were collected from 75 final year undergraduate students who voluntarily attended one-day SynNovation workshops, called 'Toolbox for Brainwaves' during 2009 and 2010. Only 54 students completed all the questionnaires. Attrition could be attributed to recipient motivation, absorptive and retentive capacity (Szulanski, 2000). The choice of a student sample was suitable, since it provided increased control over the training conditions; all student participants were working on final year projects requiring novel solutions; and Mathisen and Bronnick (2009) found no significant differences between the creativity skills of employees, compared to students, who underwent a creativity training intervention. The student sample consisted of two-thirds Business students, majoring in Innovation and Entrepreneurship, while the rest were Food Science students; 35% were male. The average age of the sample was 20.89 years. Participants were South African and diverse in terms of first language, with 59% Afrikaans speaking, 31.6% English speaking and the rest speaking an African language. Using this sample enriches our understanding of how creative skills are developed in cultural contexts, such as Sub-Saharan Africa (Petrakis, 2012) and the applicability of the stickiness framework in a different context (Johns, 2006).

Workshop structure

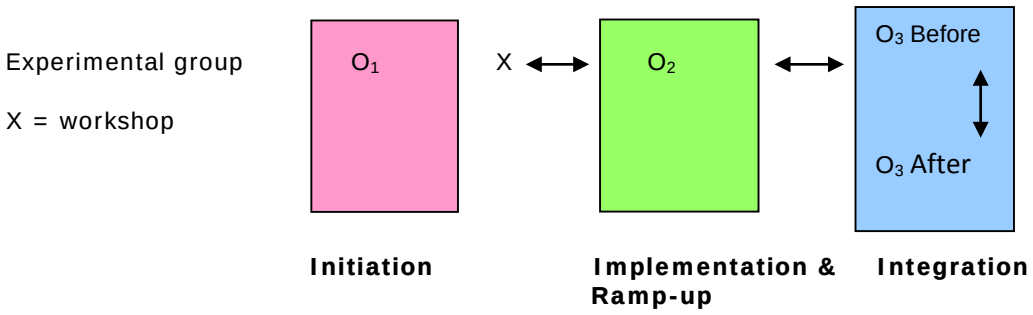
Four workshops were conducted on separate days, each accommodating a maximum of 20 participants, using the Synectics approach. The workshop commenced with an ice breaker to create a collaborative climate. The facilitator then explained the Synectics principles, and the group of 20 was split in half for experiential learning exercises. Experiential learning and reflective practice was used for creative problem-solving. Participants worked in teams using various creative techniques such as brainstorming, excursions and metaphors, allowing them to expand their creative repertoire. The Synectics process was explained, and finally opportunities were provided for teams to practice these skills.

Quasi experimental research design

The quasi-experimental pre-, post- and post-post-test design is shown in Figure 2. The stages of measurement were aligned to the stickiness stages (Szulanski, 2000). Participants rated their team creative skills four times at three different time intervals of the knowledge transfer process. Studies that only measure participants' experiences after a workshop may have biased results since participants could have highly positive feelings after an enjoyable day, only to discover after some time that no real skills transfer has taken place (Mathisen and Bronnick, 2009), therefore as indicated in Figure 2 participants were assessed at three different time intervals.

- Time O_1: This represented the initiation stage and participants were asked to rate their skills before participating in the workshop.
- Time O_2: This signifies knowledge and skills transferred after the implementation and ramp-up stages, assessing participants immediately after the workshop (X). The implementation and ramp-up stages were incorporated, since team members practiced their newly acquired skills during the workshop.
- Time O_3: Three months after the workshop a final questionnaire was administered with two main sections. Section 1 asked participants to think back to their initial skills, before the workshop and rate their skills at the initiation stage (O_3 before) and section two asked them to rate their current skills level (O_3 after) on the same factors.

Figure 2:
The quasi-experimental design: representation of the times of measurement



Questionnaire measures

Scale items were developed; aligned to the literature and learning outcomes of the workshop (Tierney and Farmer, 2002; Oldham and Cummings, 1996; Sethi et al., 2001) to assess participants' creative skills. Participants were asked to rate their perceived team creative skills on a 5-point scale, where 1 represented 'very dissatisfied' and 5 represented 'very satisfied'. The creativity constructs were teamwork, problem-solving skills and supportive communication skills (see Appendix A for specific items).

Results

Data were analysed using SPSS 19 (IBM SPSS Statistics 2011). Uni-dimensionality of creative skill constructs was assessed using factor analysis and reliability by calculating Cronbach alpha coefficients. Repeated measures analysis of variance (ANOVA) and least-square post-hoc tests were computed to determine if the mean scores of the skill constructs differed significantly over the time periods. Differences between groups were assessed with independent t-tests and one-way ANOVAs between groups.

Reliability

The internal reliability of the sub-scales for each construct was assessed using Cronbach's alpha, as shown in Table 1. The constructs had acceptable reliability; with all scores exceed the 0.70 value (Nunnally, 1978).

Table1:

Reliability results

Factors	No of items	Cronbach alpha coefficient
1. Teamwork	6	0.810
2. Problem solving skills	5	0.751
3. Supportive communication	8	0.804
Total (n)		54

Factor analysis assessed the uni-dimensionality of the creative skill factors, since the sample was too small to conduct more stringent statistical tests. Table 2 shows the factor loadings and variance explained by the items of each construct. The items of the five constructs explained more than 43% of the variance in the constructs.

Table 2:
Uni-dimensionality of constructs using factor analysis and variance explained per factor

Items	Factor 1 Teamwork	Factor 2 Problem-solving skills	Factor 3 Supportive communication
Make decisions (Item 5)	**0.598**		
Listen to others (Item 7)	**0.568**		
Teamwork (Item 12)	**0.716**		
evaluate ideas positively (Item 13)	**0.673**		
Change perspective (Item 22)	**0.637**		
Receive suggestions from team members (Item 23)	**0.749**		
Problem-solving ability (Item 4)		**0.712**	
Motivate myself (Item 11)		**0.636**	
Maintain energy during problem-solving (Item 15)		**0.703**	
Time use creative problem-solving (Item 32)		**0.717**	
Turn creative ideas into action plans (Item 33)		**0.720**	
Personal time management (item 3)			**0.638**
Assertive (Item 8)			**0.689**
Motivate others (Item 10)			**0.551**
Gain trust (Item 17)			**0.712**
Trust others (Item 18)			**0.631**
Communicate (Item 19)			**0.745**
Influence or persuade others (Item 20)			**0.820**
Build consensus (Item 21)			**0.615**
Items explaining variance in construct	43.53%	48.74%	44.25%

Descriptive Statistics

Table 3 shows the descriptive statistics for the skills constructs over the stickiness stages, indicated by the four time periods of measurement. The mean scores for all team creativity skills increased over time. Skills at the initiation stage (O_1) compared to the reflection of these skills at the integration stage (before O_3) were higher suggesting that most participants overestimated their knowledge of creativity at the initiation stage (O_1).

Table 3.
Descriptive statistics for creativity skills

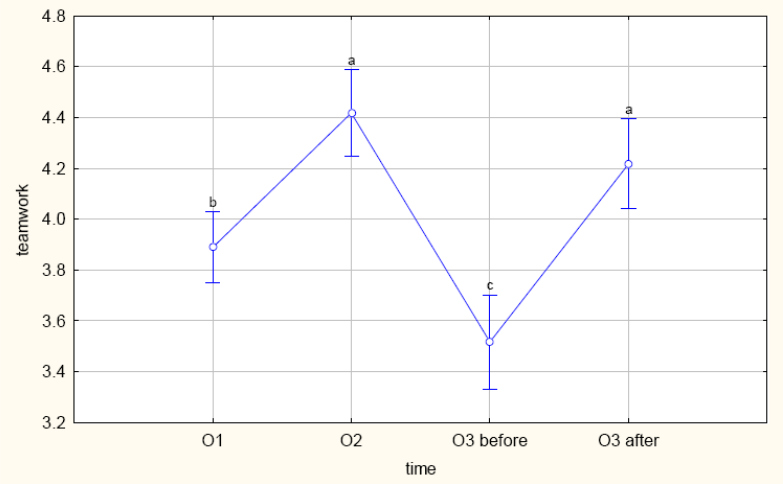
Factors	Time	N	Mean	SD	Range	Min-max
Teamwork	Initiation($O_{1)}$	75	3.871	0.527	2.67	2.17 – 4.83
	Implementation & Ramp-up (O_2)	55	4.340	0.447	2.00	3.00 – 5.00
	Reflection (before O_3)	54	3.535	0.443	2.00	2.50 – 4.50
	Integration (after O_3)	54	4.136	0.369	1.83	3.17 – 5.00
Problem-solving	Initiation($O_{1)}$	75	3.381	0.627	2.80	2.00 – 4.80
	Implementation & Ramp-up (O_2)	55	3.975	0.526	2.40	2.60 – 5.00
	Reflection (before O_3)	54	3.120	0.512	2.60	1.60 – 4.20
	Integration (after O_3)	54	3.793	0.418	1.60	3.00 – 4.60
Supportive communication	Initiation($O_{1)}$	75	3.607	0.572	2.75	2.13 – 4.88
	Implementation & Ramp-up (O_2)	55	3.969	0.444	2.13	2.88 – 5.00
	Reflection (before O_3)	54	3.353	0.4897	2.13	1.88 – 4.00
	Integration (after O_3)	54	3.836	0.374	1.88	2.63 – 4.50

Hypothesis testing

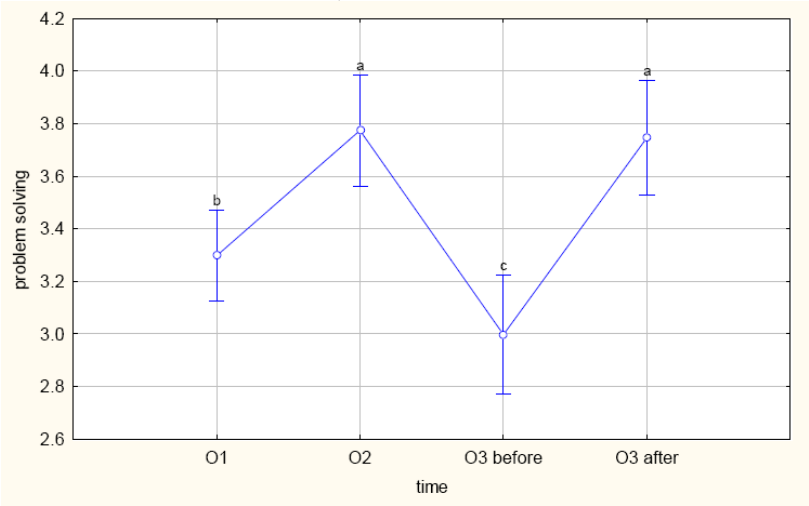
Hypotheses were assessed using repeated measures analysis of variance (ANOVA). Time was the repeated-measures factor for three measurements of the stickiness stages and the Fisher's least significant difference (LSD) post-hoc test was used to determine if the difference found between two means was due to the intervention or simply random chance. The means plots shown in Figure 3 have letters assigned to means to show relationships to other treatment means. If means had one or more letters in common, it was probable that the differences between them were not significant but were the result of random chance (Pallant, 2006). Team creative skills over the stickiness stages were assessed.

Teamwork. Teamwork means, shown in Table 3 differed significantly over the stickiness stages [Wilks Lambda=0.30, $F(3, 44) = 36.580$, $p<0.0005$, multivariate partial eta squared=.70], also reflected in the means plot, Figure 3i) with the Fisher LSD post-hoc test. Figure 3i) shows that participants were confident of their teamwork skills at the initiation stage (Time $O_{1,}$ mean = 3.933^{b}), somewhat unaware of possible shortcomings in this area (Szulanski, 2000). After the workshop at the implementation and ramp-up stages (Time O_2) participants' skills increased significantly (mean = 4.337^{a}). Three months later at the integration stage teamwork was rated slightly lower than after the workshop (Time O_3 after mean = 4.157^{a}), however this difference was not significant compared to mean of teamwork skills measured just after the workshop (Time O_2). Despite the slight decline after three months, participants retained skills acquired during the process. When asked to reflect on their teamwork skills *before* the workshop, a lower mean score is evident (Time O_3 before, mean = 3.5367^{c}) compared to their rating at the initiation stage (Time $O_{1,}$ mean = 3.933^{b}). The significant difference suggests that participants reflectively perceived shortcomings in their skills at the initiation stage and realised after the workshop that they were perhaps overconfident.

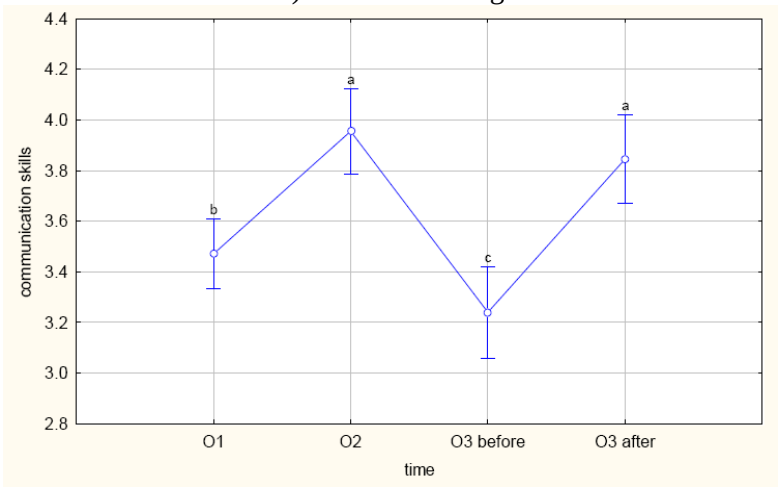
Figure 3:
Post-Hoc Fisher LSD Tests: Team Creative Competencies Vertical bars denote 95% confidence intervals



i) Teamwork



ii) Problem-solving



iii) Communication

The ANOVA indicate a significant effect for problem-solving skills for the different stickiness stages as well [Wilks Lambda=0.31, $F(3, 46) = 34.521$, $p<0.0005$, multivariate partial eta squared=.69], as shown in the means plot in Figure 3ii). At the

initiation stage participants were self-assured of their problem-solving skills (Time O_1, mean = 3.400[b]), their skills increased significantly after the intervention at the implementation and ramp-up stages (Time O_2, mean = 3.988[a]) and did not decline significantly three months after (Time O_3 after mean = 3.820[a]). This could be due to specific processes and guidelines practiced during the workshops, making these skills easier to retain, compared to teamwork skills. When participants reflected on their skills at the initiation stage (Time O_3 before, mean = 3.110[c]), they perceived the lack of their problem-solving skills significantly greater, compared to time O_1.

Supportive communication mean scores were also significantly different over time [Wilks Lambda=0.44, $F(3, 47) = 20.780$, $p<0.0005$], however the effect size was not as strong as for the other constructs (multivariate partial eta squared =.57). Figure 3iii) shows the post-hoc LSD test's results. Prior to the workshop (Time O_1, mean=3.593[b]) participants were satisfied with their supportive communications skills, however their ratings in this area improved significantly at the implementation and ramp-up stages (Time O_2, mean=3.978[a]). The perceived improvement of this skill endured to the integration stage (Time O_3 after mean=3.8600[a]). Participants' overconfidence of this skill at the initiation stage (Time O_3 before, mean=3.366[c]) is reflected in Figure 3iii).

The results from Figure 3 enable assessment of the hypotheses. Hypotheses 1, relating to participants' assessment of their various team creative skills is accepted for all team skills, since teamwork, problem-solving and supportive communication were assessed more favourably at the initiation stage (O_1), compared to reflection at the integration stage (O_3 before). Teamwork, problem-solving and supportive communication skills were at their highest after the implementation and ramp-up stickiness stages, supporting Hypothesis 3, however hypothesis 4 proposing that team creative skills will decline after the integration stage cannot be accepted, since the decline in these three skills after three months was not significant, with skills retained at high levels.

The sample groups were also compared in terms of gender, study major and age groups for creative skills across the stickiness stages, using independent sample t-tests. No significant differences were found between the team and individual creative skills for males and females ($p>0.05$); or for study majors (Business and Food Science students). Furthermore one-way analysis of variance found no significant differences between three age groups (group 1, aged 20 years and younger; group 2, aged 21 and 22; and group 3, aged older than 23 years) for creative skills. Therefore Hypothesis 2 was not supported.

Discussion, limitations and contribution

This paper examined development of team creative skills through stickiness stages, using the Synectics approach. Team creative skills were reflected by teamwork, problem-solving and supportive communication skills. The stickiness stages (initiation, implementation, ramp-up and integration) over the creative skills development process provided a valuable framework to understand where skill losses may occur in the team context.

The findings showed that Synectics is an effective approach to develop and enhance team creative skills, overcoming stickiness in different stages, through the method and creative tools employed. Synectics workshops allowed time for knowledge acquisition and skills development through experiential learning. Team creative skills increased significantly after the workshops and remained high three months after, confirming Mathisen and Bronnick's (2009) study where the effect of training showed a longer-term effect. This study extends their work by showing that team creative skills can improve over time, where the use of a suitable creative problem-solving process and awareness of stickiness stages, can result in designing interventions to

minimise barriers to knowledge transfer and skills development. Experiential skills are better retained, compared to just knowledge acquisition of the creative process.

Several methodological limitations of the study can be noted. Firstly, this study did not utilise a control group, which means it is possible that other external factors could have led to an increase in the skills of all students; however measuring multiple dependent variables in a pre-test, post-post-test design lessens this threat. Secondly there was a substantial reduction in sample sizes from the initiation stage (Time O_1) to the integration stage (Time O_3), since participation was voluntary. Although there was no significant non-response bias evident in the demographic variables or academic performance of participants vs. non-participants enrolled in the same academic course, it is possible that the motivation of the non-participants differed from the participants. Finally the use of student samples has been criticised (Gordon et al., 1986); this may be a limitation, although Mathisen and Bronnick (2009) did not find significant differences between the creative skills of employees and student participants after a training intervention. Future studies and replications should utilise a control group, implement processes to minimise sample attrition, and choose samples from actual workplace contexts to determine how organisational politics influence creativity knowledge transfer and knowledge creation.

Theoretically this study contributes in three main ways. Firstly, it provides a more nuanced understanding of team creative skills by showing how teamwork, problem-solving and supportive communication skills contribute to the process. This fine-grained analysis of the different skill components relevant to team creativity can be used to explain differences in team performance. Using the stickiness stages enhances understanding that the development of creativity skills requires a maturation process (Szulanski, 2000) responding to recent calls for stimulating creativity in the management classroom (Baker and Baker, 2012). Secondly, this study finds that a workshop, based on Synectics principles where efforts are made in the design, planning and method to mitigate stickiness, is effective in transferring creative skills over time. The assignment of group roles, guidelines for creative behavioural processes and reflective practice interact to enhance the effectiveness of the workshop. Thirdly, the design of the study also demonstrates that skills development should be assessed multiple times over several stickiness stages, to ensure the effects endure over time. While it may it seem arduous to track these skills over time, it enables both learners and educators to appreciate the value of tracking graduate attributes and examining the relevance of these attributes in the future world of work.

This study has several important implications for management educators. The findings show that in courses that promote creative problem-solving such as leadership, entrepreneurship and project-based courses, it is realistic to teach team creative skills and use reflective practice as assessment strategies, provided a supportive classroom environment is created to inspire creativity. Novel and adaptive thinking skills can thus be cultivated and graduates shown how to transfer their skills and use it in various situations, to solve personal career challenges, as well as organizational and societal challenges. In an increasing networked, collaborative economy teamwork, interpersonal skills and collaboration will become increasingly important (Curtis and McKenzie, 2002). The findings confirm that an experiential learning approach within a supportive environment is effective to develop team creativity.

The findings highlight several directions for future research. Studies which investigate the interaction between knowledge creation, team creative skills and the role of positive affect in teams should yield valuable insights. It would be interesting to investigate whether positive affect leads to higher levels of creativity, quality of ideas and the effect on the team climate. In addition discovering how creative skills facilitate “successful” opportunity recognition would yield valuable insights, specifically the role it plays during the incubation and elaboration stages for innovation, marketing and

entrepreneurship scholars. Multiple methods such as longitudinal qualitative and interpretative methods hold promise for advancing discipline understanding of knowledge creation and creativity within teams.

In conclusion this study shows how management educators can stimulate team creativity among graduates, taking into account the value of time and stickiness stage. Synectics principles are effective in developing creativity, with significant improvements reported after the implementation and ramp-up stages, and skills retained up to three months later at the integration stage. Experiential learning is an effective pedagogical methods to cultivate novel and adaptive thinking as a graduate attribute. In fact it is useful to be reminded that 'years after graduates leave university, many of the content and details meticulously shared will be forgotten, what endures is how we have taught students to think' (Baker and Baker, 2012:721).

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Appendix 1:
Items measuring Creativity Skills Constructs

Teamwork
Make effective decisions
Listen to others
Work with others in a team
Evaluate ideas in a positive manner
Willingness to change perspective
Receive suggestions of team members

Problem-solving skills
Solve complex problems
Motivate myself
Maintain high energy levels, during problem-solving
Know how to turn creative ideas into action plans

Supportive communication
Manage time effectively when being creative
Be assertive
Motivate others
Gain the trust of others
Willingness to trust others
Ability to communicate
Influence or persuade others
Build consensus