Learning teams' diversity and innovative capacity

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Introduction

The gastronomy programme (bachelor in Food and Meal Science) has for many years been working with innovative processes and has created a number of courses aimed at developing innovative generic skills and creative self-efficacy among its students. One of these courses is "Creative Concept and Product Development". The course presents the students with an opportunity to develop new, creative foods and meals in teams of learners. The course, in its present form, has now run for four years, and in course evaluations, students have expressed satisfaction with their innovative skill development and the usefulness of the skills acquired for their future career. While the course has received many positive evaluations, a systematic evaluation of its structure and implementation has not yet been performed. Evaluations of the course suggest that teamwork is an important element of learning and development especially in regard to students' innovative capacity.

Project aim

The project aims to evaluate how different aspects of teamwork (e.g. diversity, experiences) relate to students' development of innovative skills. It also aims to provide understanding of how the formation of the learning teams could be carried out, i.e. by self-selection or teacher selection, as well as to what extent the teacher's involvement play a role in the team learning process leading to acquisition of innovative capacity in teams.

Theoretical basis

The theoretical basis of the project lies in the field of collaborative learning (e.g. Bruffee, 1993), team learning (Slavin, 1978) and well as the acquisition of generic skills in the collaborative and team learning processes. The project utilised an Input-Process-Output (Ilgen, et al.

2005) model where we explored how team members' diversity in background and experiences related to teams' behavioural integration, ultimately relating to the self-perceived acquisition of innovative skills. This study puts specific emphasis on the team-related processes that take place in the teams. In this exploration, we draw on the findings by Lubatkin et al. (2006) that explore the concept of behavioural integration, referring to the ability of the unit (team) to working as one whole. We also draw on the review by Lemieux-Charles & McGuire (2006) that discusses team processes in terms of communication, coordination, cooperation and conflict.

Data collection and Results

Survey

The collection of data was carried out through three repetitive surveys of the learning teams participating in "Creative concept and product development" where students in groups aim at developing new products. Data collection took place in vt18 (P3–4) given that the course runs only once a year. The class consisted of 22 students organised into five groups with 4–5 individuals per group. The data collected comprised groups' gender, ethnicity, age, work experience and study experience diversities. The demographics of the groups were also explored through mean values (average) of continuous variables such as age, and duration of work and study experience. To explore the ethnic composition of the groups, we asked students to report their mother tongue as well as the mother tongues of their parents. To explore group processes, we applied and measured the concept of behavioural integration (Lubatkin et al., 2003) and recorded the averages of self-perceived performance and innovative capacity in order to use these on the group level. The descriptive statistics for the entire sample are presented in Table 1. Some of the aspects will be commented on in the analysis section of the report. Analysis of the data was performed by means of descriptive statistics and correlations; more advanced analysis was unfortunately not possible given the limited number of groups taking part in the study.

Diaries

The project also utilised reflective diaries written by the students during the course. Thirteen out of 22 students agreed for their anonymised diaries to be part of the data of the project. The project employed thematic analysis (Fereday & Muir-Cochrane, 2006) in order to identify different processes and reflective outcomes of each student while performing their teamwork.

Ethical considerations

The study offered students anonymity and confidentiality, oral and written consent was received from all the students of the course, and students could opt out from all or some parts of the study.

Table 1: *Descriptive statistics of the sample*

	Variable	N	Min	Max	Mean	StD
Group Diversity	Gender.Diversity	15	0,00	1,00	0,2000	0,41404
	Ethnic.Diversity	15	0,00	1,00	0,4000	0,50709
	Ethnic.Diversity Mother	15	0,00	1,00	0,8000	0,41404
	Ethnic.Diversity Father	15	0,00	1,00	0,6000	0,50709
	Age Diversity	15	1,50	3,10	2,4539	0,63033
	Work Experience Diversity	15	1,87	5,97	4,3038	1,58454
	Study experience Diversity	15	0,00	1,73	0,6060	0,61665
Group Averages	Age Mean	15	24,00	25,75	24,5167	0,50415
	Work Experience Mean	15	2,00	6,75	4,2500	1,66100
	Study experience Mean	15	1,88	2,50	2,2113	0,24259
Controls	Previous experience in the group	15	0,00	1,00	0,4000	0,50709
	Group.Size	15	4,00	5,00	4,4000	0,50709
Process	Behavioral Integration	15	4,50	6,40	5,2950	0,53920
Outcomes	Perceived performance	15	4,60	6,38	5,3483	0,47645
	Perceived innovative capacity	15	5,00	6,06	5,3892	0,29051
Periods	Period 1	15	0,00	1,00	0,3333	0,48795
	Period 2	15	0,00	1,00	0,3333	0,48795
	Period 3	15	0,00	1,00	0,3333	0,48795

Results

Quantitative results

Table 1 suggests that the groups on the course felt well-behaviourally integrated with each other, with a mean score of 5.2 on the scale of 7, despite being relatively diverse in various other dimensions such as age and work experience. The same table also shows that groups considered themselves to perform well and perceived that the group's innovative capacity was high; mean scores for both aspects are 5.3 on the seven-point Likert-scale.

Table 2, reporting the Spearman correlation coefficient, reveals some interesting results. For example, we find indications that when there is an ethnic diversity in the group (due to some of the group members having foreign-born fathers) it has a positive relation to the group's behavioural integration. There are further indications that a higher mean age of the group has a significant negative relation with behavioural integration. Connected to that we also find that increasing age diversity has a significant negative correlation with behavioural integration. Our correlation matrix also shows that if groups have worked previously with each other this has a weak positive relation with perceived performance. Finally, we find an indication that behaviourally integrated groups feel more innovative.

Table 2: *Spearman correlation matrix*

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Group.Size																	
2 Gender.Diversity	0,61*																
3 Ethnic.Diversity	0,17	-0,41															
4 Ethnic.Diversity Mother	0,41	0,25	0,41														
5 Ethnic.Diversity Father	-0,17	-0,61*	0,67**	0,61*													
6 Age Mean	-0,21	0,33	-0,96**	-0,33	-0,53*												
7 Age Diversity	-0,29	0	-0,32	-0,65**	-0,53*	0,39											
8 Work Experience Mean	-0,87**	-0,35	-0,29	0	0,29	0,37	0,05										
9 Work Experience Diversity	-0,58*	0	-0,29	-0,71**	-0,58*	0,20	0,66**	0,30									
10 Study experience Mean	0,57*	0,70**	-0,29	-0,35	-0,86**	0,16	0,36	-0,70**	0,30								
11 Study experience Diversity	0,87**	0,71**	-0,29	0	-0,58*	0,20	-0,01	-0,80**	-0,30	0,80**							
12 Previous experience in the group	0,17	0,61*	0,17	0,41	-0,17	-0,21	-0,03	0	0,29	0,29	0						
13 Behavioral Integration	-0,02	-0,31	0,37	0,33	0,53*	-0,45†	-0,65**	0,08	-0,36	-0,44†	-0,24	-0,13					
14 Perceived performance	0,19	-0,16	-0,02	-0,23	-0,06	-0,08	-0,31	-0,32	-0,21	0,10	0,27	-0,46†	0,40				
15 Perceived innovative capacity	-0,16	-0,06	0,11	0,21	0,22	-0,09	-0,19	0,25	-0,01	-0,27	-0,26	0,17	0,57*	0,17			
16 Period 1	0	0	0	0	0	-0,06	-0,05	0	0,02	-0,07	0	0	0,12	-0,31	0,15		
17 Period2	0	0	0	0	0	-0,06	-0,02	0	0,02	0,03	0	0	-0,03	-0,07	-0,49†	-0,5†	
18 Period3	0	0	0	0	0	0,11	0,07	0	-0,03	0,03	0	0	-0,08	0,38	0,35	-0,5†	-0,5†

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Qualitative results

By means of theatric analysis, six themes (Table 3) emerged that related to the different processes represented in this study and that took place within the groups. While it was hard to demonstrate a specific relation between group diversity and these processes, we could however reflect on the consequences these processes could have for the innovative capacity of the groups as well as their performance.

Table 3: *Themes*

Leadership in the group
Conflict
Division of labour (or lack of it)
Student interaction
I and the group
Inclusion and cooperation

In theme *Leadership in the group* we observed that through the group work on a creative assignment the group members started to reflect on their own and other group members' leadership abilities and roles in the group. This suggests that even if the assignment is highly creative there

should be leadership structures that support the creativity process. Another finding that emerged here was related to the students' realisation of their own leadership skills or the lack of them, a new insight that was emancipating for some of them.

In the theme *Conflict,* we could see students' awareness of the conflicts that arose in the group, yet the students were very mild in their description of the conflicts, and no mentioning of conflict resolution could be found in student diaries. When reflecting on the conflicts some students suggested that they primarily occurred in the kitchen and lectures and had no spillover effect outside of the university. Nevertheless, it is notable that while conflict aspects were discussed, conflict solutions were not mentioned.

The *Division of labour* (or lack of it) theme showed that students had different opinions as to how division of labour was organised. Some students indicated dissatisfaction with the initial division of labour that was hard to change in the middle of the process. Some students thought that it was good to work individually and that the group work itself was only a liability that was stipulated by the division of labour. The students' testimonies suggested that they might have felt unsatisfied with the division of labour but did not do much to change it.

The *Student interaction* theme was somewhat divided: some students claimed that their groups had too little communication which led to misunderstandings in the group, and these students felt that it influenced the end results. Yet some students suggested that their communication via social media as well as in person, was a wonderful way of achieving the desired outcomes

In the *I and the group* theme, students' reflections on their contribution to the group emerged. The reflections here circled around what students could and could not and how this would relate to the group dynamics. Here an interesting aspect is that students appeared to gain in self-awareness by achieving self-realisation of what their contributions were

and most importantly that it was recognised by others in the group and by the teacher.

Finally, the theme *Inclusion and cooperation* suggested that most of the groups had a very good experience of cooperation with each other and felt themselves included in different decisions. This could suggest that having one common purpose and looking forward to attaining it created positive group dynamics. Shared purpose orientation stimulated the co-operative spirit and the well-defined nature of the outcome was important for attaining it.

Discussion

Our findings lead us to a number of practice-oriented suggestions that could be considered in designing the classes that employ team-based project work and collaborative learning. Given the increasing diversity of the student body regarding different demographic and experience-related dimensions our findings provide clues as to how this diversity relates to team-related process and outcomes, and also suggest ways forward for managing this diversity. We present these suggestions along the lines of our different methodological inquiries and in the bullet list below.

- Our study suggests that self-assigned groups in our class chose to form gender-homogeneous groups, yet with some variation in other dimensions. While there are positive aspects of self-selection, by creating gender-homogeneous groups the students might be missing out on the creativity and performance that has been shown to be associated with gender-diverse groups (Umans et al., 2008). Thus one possibility would be to provide students at the beginning of their studies with information on the potential benefits of diverse groups, especially when it comes to gender.

- Our findings suggest that some degree of ethnic diversity (when the fathers of some members come from different ethnic backgrounds) could be beneficial for a group's behavioural integration. Thus, the results of the majority of the studies suggesting a negative relation

between ethnic diversity and behavioural integration (Umans, 2012) might be a reflection of an insufficiently measured ethnicity construct where the respondents are asked to tick one box without the possibility to provide a more detailed answer on how they feel about their ethnic identity and that of their parents. Our findings further suggest that increasing the average age of the team and the age diversity of the team has a negative relation to behavioural integration. These findings need to be interpreted with caution, but could suggest that diverse older students' groups do not have the proper tools to manage their processes. Something similar also appears in the relationship between average study experience and behavioural integration that further suggests some divergence of expectation with increasing study experience, a course of events that groups appear unable to manage to their own benefit. Overall, the findings suggest that students need to be made more aware of the benefits and challenges of diversity in their groups, and more importantly, of the techniques for managing these differences. So, one could consider implementing team-based simulations or team-related exercises at different points in the education to bring the awareness forward.

- Interestingly we find that previous work experience in the same grouping has a negative relation to perceived performance. While hard to untangle this could suggest somewhat lower expectations from people one has previous experience of working with. Again, one way forward could be to encourage new group constellations compared to those is previous courses, reflecting the fact that in real life it is not possible to choose team members in the workplaces.

- In line with expectations, we found that harmonious, behaviourally integrated teams perceived themselves as being more creative. This suggests that a positive work climate and the ability to make joint decisions are beneficial for creative self-efficacy. This is something that might need to be introduced to the students prior to their group work through a discussion and presentation of what forges creative

groups and what aspects of the teamwork are most important. Here again, a module on teamwork discussing ways of managing processes and explaining what good teamwork is would be beneficial.

- Our findings further suggest that leadership is something students perceived as important in their group work, but they were unsure what leadership really consists of. Here, another important learning aspect for the instructors to consider is to discuss with students what type of leadership works in groups and what different roles individuals can take in the groups. The message that should be brought forward to the students is that, in order to be creative, one needs specific team structures, and appointing a leader is one important aspect of this. That implies a leader that takes charge and is accepted by the group in guiding it towards the specific aim. Thus, introducing leadership development models in education could be a way forward.

- Conflict management might not be something students have benefited from in their education. We have some indications that students might not be aware of the conflict management concept, and that they focus on the presence of the conflict rather than solutions. In this context, it is important to discuss conflict management techniques as well as to emphasise that not every conflict is negative and some degree of disagreement could be beneficial for the group as long as that conflict does not escalate from being more task-related to being more emotional.

- Our findings further suggest that students do not appear to have the tools to work with the division of labour, or to discuss the process of division of tasks. These are things one should consider introducing students to. For example, one can be introduced to the idea of holding formal team meetings with brainstorm sessions or one can consider also introducing past team work session de-briefings. This probably needs to become a routinised practice introduced by the instructors.

- We also find that misunderstanding could be destructive to the innovative spirit of the group work, but we also find that our groups have found a way to deal with it by using different means to communicate in an effective manner, usually by social media. Although there are learning platforms at Kristianstad University that are used in communication, one potential way forward could be to encourage the students to create social groups in social media to manage and facilitate communication in their groups.

- We find indications that individuals working in groups benefit from hearing praise from both their team members and the instructor, and this in turn can improve and develop the teamwork. This is an aspect that should be considered when having team-based classes i.e. to balance between group and individual praise and encouragement.

- Finally, our study suggests that formulating a clear purpose might be more important for creative groups than the challenges they face in their intergroup processes. Our study provides some evidence that having a clear, measurable goal is one of the most important aspects of making diverse teams work well and become creative. Not all team-based courses have a tangible outcome (like a tangible product or meal) of their work, but the gastronomy course does and that may contribute to making the students' teamwork journey smooth. The value of creating an assessable "product" that is closely connected to reality might be the most important finding and important for other team-based courses. By a common endeavour in developing such a "product", learning teams could become more innovative.

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