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Intercultural virtual student teams open innovating via online social networks

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Abstract: Effective functioning of geographically dispersed, culturally mixed work team is essential for global business success in the era of open innovation. Therefore it is vital to understand and learn how to innovate in a virtually supported intercultural open innovation environments. This case study is developing and testing virtually supported intercultural open innovation process in context of higher education. Our aim is to develop better teaching solutions for experimental innovation learning while on the side evaluating higher education student's motivation and benefits to participate on the online social network based intercultural innovation process. Outcome of this study is theoretically constructed, partially virtual, intercultural open innovation learning process, which is pilot tested and based on the test results further developed and evaluated against existing theoretical knowledge.

Keywords: intercultural, open innovation, social network, higher education, virtual team

1 Introduction

Innovations are and have always been an important building stone for achieving a business success in a highly competitive global business environment. However, according to open innovation thinkers, in the future business success will depend more and more on the ability to utilize external resources via open innovation processes (e.g. Chesbrough, 2003). Due to Internet and especially the rapid growth of the recent online social network phenomenon (Cachia, Compañó and Da Costa, 2007), the technological and behavioral changes have created the most promising platform for global collaboration. With the help of today's online technology, we can relatively easily and cost effectively combine people from geographically dispersed and distant cultures as a one virtual intercultural team. In practice these kind of networked and team based virtual structures have already challenged the traditional hierarchical organization (Shokley-Zalaback, 2002).

Therefore in our opinion it is vital to understand and learn how to innovate in a virtually supported intercultural open innovation environments. Students must be prepared for their working life careers by offering them opportunities to experience open innovation collaboration via virtual online collaboration (adopted from Burniske and Monke, 2001). Generally speaking there seems to be a clear lack of studies focusing social network based learning methods for intercultural innovation studies. As a result in

this case study, we are particularly interested to develop and test virtually supported intercultural open innovation process in context of higher education studies.

This paper is organized as follows. First, we introduce theoretical foundations of intercultural online innovation collaboration. Secondly, we present our research design including research objectives, experimental learning setting and Massidea.org – a virtual open innovation platform. Thirdly, we present our results based on pre experiment survey, post experiment interviews and a constructive action research observations from author of this study. Finally, we conclude our findings.

2 Introducing the Theoretical Foundations of Global Intercultural Online Collaboration

2.1 Taxonomy for Global Innovations

Archibugi and Iammarino (2002) defined globalization as a high degree of interdependency and interrelatedness among different and geographically dispersed actors while introducing the main categories of globalization of innovation by Achibugi and Michie (1995, 1997): *First*, the international exploitation of technology produced on a national basis (i.e. innovators expanding their domestic innovations to global markets). *Second*, the global generation of innovations (i.e. innovations generated from the start to global markets). *Third*, the global technological collaborations (i.e. two or more organizations establishing a joint venture with the aim of generating innovations). The first two categories present main alternative foundations for studying global virtual open innovation. In this case study context the third joint venture option can be interpreted as an aim to establish long-term and formal agreement to perform either joint projects or permanent course collaboration.

From our perspective in the first case – *international expansion of national innovation* – the collaboration model would typically be based on ready made domestic innovations, while global studying partners would offer help on conducting feasibility or localization studies for the target market. The second case – *born global innovations* – are founding more challenging model for virtually supported innovation studies. In this case, participants would collaborative generate novel innovations which are right away suitable for global market. Presumably this latter model would offer more interesting environment for innovation studies. The third model – *joint venture* – is essential for building cost effective and long-term partnerships between educational institutes, yet the previous two models can also be implemented in a one-off experimental setting structure as we have done in this case study.

2.2 Aims of Intercultural Innovation Learning

Effective functioning of geographically dispersed, culturally mixed work team is essential for global business success (Hofner Saphiere, 1996). A intercultural team (or sometimes also called as multicultural) is a small group of people including two or more cultures and people with complementary skills equally committed to a common purpose, goals and working approach for which they hold themselves mutually accountable (Katzenbach and Smith, 1999, Marquardt and Horvath, 2001). According to Teräs (2007) intercultural disciplines typically includes intercultural communication (Gudykunst and

Mody 2002), intercultural training (Landis, Bennett and Bennett 2004) and intercultural education (Räsänen and San, 2005) which also form a foundation for our virtually supported open innovation studies.

In educational context besides embracing equal opportunities to learn (Banks, 2001), multicultural (or as we define intercultural) innovation learning aims to provide students the skills, attitudes, and knowledge they need to function with their own culture and across all the other cultures while generating global innovations in collaboration with other team member (modified from Teräs 2007).

23. Strength and Weaknesses of Intercultural Collaboration

It is known that online collaboration allow students to develop their technical skills and become sensitized to the capabilities of the foreign students (Grosse 2002, Odenwald, 1996). Students working in intercultural teams learn to negotiate, make group decisions and synergy, explore different perspectives and sort out differences in online etiquette (Eastman and Swift, 2002, Adler, 2002). Admittedly these all are important skills when open innovating with others. While experimenting with various asynchronous and synchronous communication methods, student understand the advantages and disadvantages of different channels and are able to sharpen their communication skills (Zhu, Gareis, O'Keefe, Bazzoni, and Rolland, 2005).

A significant body of research has studied cultural diversity and team outcomes and produced mixed and often contradictory results as summarized by Stahl et. al (2009). Besides excellent literature review their meta-analysis study evaluated how task complexity and structural aspects of the team including team size, tenure and dispersion is moderating on cultural diversity on teams. According to their result, cultural diversity is leading to process losses through task conflict and decreased social integration, but gains through increased creativity and cultural diversity.

24. Motivation to Participate in Virtual Communities

Motivation to participate in virtual communities has recently been extensive summarized by Gaston-Breton et. al. (2009), which definition (e.g. Pentina et. al. 2008) is somewhat similar to online social network definition what we are using to describe communities and hosted services facilitating collaboration and sharing between users (Cachia, et. al., 2007). Also Muhdi and Boutellier (2010) listed 39 motivation factors and investigated their impact among Swiss innovation communities. Moreover, Santonen and Lehtelä (2010) evaluated higher education student's motivation to participate in online mass innovation while using Massidea.org as a case example (i.e. the same platform as this case study). Therefore above studies are suggested for those who are interested to know more about motivation factor theories.

3 Research Methodology

3.1 Research Objectives

This case study is developing and testing virtually supported intercultural open innovation process in context of higher education. Our aim is to develop better teaching solutions for experimental innovation learning while on the side evaluating higher

education student's motivation and benefits to participate on the online social network based intercultural innovation process.

3.2 Data Collection and Sample Selection

Our single case study (Yin, 1990) applies a constructive action research paradigm (e.g. Kasanen et. al. 1993) while using multiple sources of evidence. According to Jaatinen and Lavikka (2008) constructive research aims to develop a solution to a practically relevant problem by applying theoretical knowledge and demonstrating the functioning and innovativeness of the suggested solution. To evaluate suitable theoretical frameworks, computerized searches to several different scientific journal databases were conducted and as a result relevant theories were selected. Besides data collection for scientific purposes, in action research researchers have an active role in development and implementation efforts. Author of this study has both theoretically and conceptually developed in dozen scientific publications a virtual open innovation mass collaboration platform – Massidea.org – , which was used during the learning experiment. Moreover, author is also leading the 1.1 MEUR development project of tested innovation platform. Finally, author co-developed and co-implemented the intercultural innovation course which is acting as unit of analysis of this study.

Inter-cultural research divides learning into two categories: didactic (information-giving) and experiential learning activities (Kealey and Protheroe, 1996). Our case is considered as experiential case with problem based learning approach (Peterson, 2004), which in know to improve learning and positive attitudes (Ravenscroft, 1997), allows participants to gain knowledge from social interaction (Vygotsky 1978, 1986) and encourage enthusiasm and develop critical thinking skills (Major and Palmer 2001), which also are important elements for successful innovation process.

Experimental settings for intercultural innovation process included 16 students from Finland, 10 students from France and 10 students from India. In this study Finnish students acted as the main student sample group, since only they took part in the full experiment. In-depth interviews with Finnish students were recorded, then transcribed as text and finally analyzed individually and as a group. These interviews were made by external research assistants in order limit author's effect on the student respondents. In our opinion this was required since author was also partially acting as course teacher, thus he was not participating the student evaluation or giving the study credits. To increase text analysis reliability, *first* research assistants made preliminary text analyze individually, *secondly* resolved all disagreements by discussion between each other and *finally* author of this study used their summary table as starting point to analyses while verifying the summary conclusions from the individual respondent's transcriptions.

Also before the course, a background information survey evaluating Finnish student's attitudes towards motivation factors to participate in online communities was conducted.

3.3 Experimental Setting Description and model construction

Actual learning experiment and initial intercultural open innovation process (see Appendix 1 for more detail description) followed typical fuzzy-front end of innovation (Smith and Reinertsen, 1991) stage-gate process (Cooper, 1988) starting from scoping by finding scientific articles from research journal databases and writing narrative story which combines theoretical issues and personal service experiences. Followed by

introduction of virtual collaboration platform and jointly agreed constructive feedback guidelines and individual studying task to define relevant intercultural problem. Virtual collaboration included problem peer-commenting from other course members and students from France. In third stage Finnish students noted given feedback and provided a solution to their problem. Again peer feedback from Finland and France was given. Fourth stage included idea screening by promoting own idea face-to-face to other Finnish students and selecting top 3 to 5 ideas from whole group. The best ideas were presented via Skype conference to students from India as a purpose to have feedback from completely different cultural background and instead of previous asynchronous written communication method, collect direct verbal feedback. In fifth stage Finnish students formed small groups and expanded in an iterative development process the selected idea descriptions to a concept drafts with the help of peer-commenting from other groups. In final stage, groups prepared elevator pitch and presented them to a group of company representatives in attempted to convince them about the eligibility of their concept. Feedback from these working life specialists was given.

3.4 Introducing Massidea.org virtual collaboration platform

Massidea.org is a free of charge open innovation community where people can share their ideas, discuss today's challenges as well as visions of the future; key factors when creating new innovations. By intelligently connecting people and their insights with the help of content recommendation, a creative space that can boost individual and communal creativity is constructed. In Massidea.org, public, private and educational sector organizations and individual users and citizens can collaborate with the wide and global range of masses of people. Technologically Massidea.org is grounded on open source solution (e.g. www.opensource.org).

Grounded on the beliefs of the open innovation and online social networks, original idea of Massidea.org was introduced in *“Introduction to National Open Innovation System (NOIS) Paradigm. A Preliminary Concept for Interchange”* by Santonen et. al (2007). Since then, the Massidea.org concept has been developed from different points of views including content recommendation support to individual creativity by Santonen et. al. (2008), Massidea.org integration to Triple Helix model (2008), defining the digital business ecosystem (DBE) for Massidea.org by Santonen and Karhu (2010) and introducing generic success measures for rewarding model Santonen et. al. (2011). Moreover, implementing Massidea.org as a part of higher education system has previously been evaluated with the help a historical timeline by Santonen (2009), using Profiting From Innovation approach by Kaivo-oja and Santonen (2010), evaluating student's motivation to participate in online mass innovation (2010), defining Massidea.org as a business model innovation from Stage-Gate Process point of view by Santonen and Schallmo (2011).

4 Results

4.1 Sample Group Description

In all 19 Finnish students enrolled to the course. It is important to note that the course was mandatory for them, which might somewhat bias our results. Fifteen (15) out of

these students participated on the pre experiment survey and sixteen (16) were interviewed after the course. Based on pre experiment survey results student's age was varying between 19 to 26 years, while all but one were first year students. Male/Female division was nearly even (40/60). About 40 percent of group considered themselves as very experienced internet and online communication tools user, while rest 60 percent considered themselves as moderate user. About 20 percent of the students were reading and observing in online communities without active participation such as commenting, voting, rating or producing content. Rest 80 percent of the group were occasionally participating actively, but none of the students considered themselves as active and frequent participant of online communities. According to these result, this sample group typify rather well typical young age online users and therefore is suitable for our research purposes.

4.2 Pre experiment results –Initial motivation factors ranking – Student viewpoint

Before the actual learning experiment, we evaluated the main sample group's (i.e. Finnish students) prior motivation to use Massidea.org as a collaborative innovation tool in their course context. Since the student did not have any preceding knowledge about Massidea.org, the survey included detailed concept definition for respondents. In addition to typical generic description of main functionalities, the questionnaire also included an extensive set of reward schema questions. In these questions students had to evaluate on a scale of 0 to 100 points, how many point each action would result them, if Massidea.org would include point collection based reward system (e.g. how many point you should have, if you comment some other user's content). These reward questions on the other hand helped us to explain the main principles and functionalities of Massidea.org to students.

Motivation related questions were adapted and modified from the previous work of Muhdi and Boutellier (2010). Their classification included 39 motivational items, which were categorized into six main categories including rewards, learning, sense of efficiency, social aspects, competition and platform features. Since 11 of their questions were purely platform features, they were omitted. Also various questions in original item set included different actor perspective such as receiving recognition from the community or receiving recognition from the company. In our modified item set, actor point of view was omitted and these questions were combined as one statement such as "receiving recognition". Finally some additional modifications were made to better fit the motivation items in our innovation learning platform context. As a result our final set included 19 motivational items.

Due to very limited sample size (N=15), we cannot make any generalization of our results (Appendix 2), but only to look for indications what are the student group expectations for the learning experiment. According to results in Appendix 2, getting feedback from others, making own insights visible, gathering new viewpoint, sharing knowledge with others and further develop own insights were the 5 top ranking motivation factors, while to become famous, to win prizes, to get recognition, to compete with other and have fun were the 5 least ranking motivation factors out of items.

These pre experiment results appeared to be interesting for our educationally focused process. The top ranking features emphasizes the benefits of collaborative innovation process from learning and sense of efficiency point of views. In practice student were

expecting to share their knowledge with others, while at the same time gain new knowledge throughout this collaborative learning process. Interestingly bottom ranking features were mainly related to hard rewards and competition. When these results are compared to previous findings by Muhdi and Boutellier (2010), it seems that from student point of view Massidea.org as a platform is more comparable to company-hosted internal innovation communities than innovation intermediary communities.

4.2 Post experiment results

After end of the course, in-depth interviews with Finnish students (N=16) were conducted in order to understand their perceptions about the achievement of course objectives, studying model and implementation of Massidea.org open innovation tool to the course.

Interestingly, students did not have any specific expectation or personal goals for the course besides simply learning language and communication skills. Typically students were just attending to a course sometimes without even fully knowing what the course is all about. This kind of initial situation generates additional challenge for collaborative innovation process implementation, which requires willingness, passion and commitment to generate successful collaboration.

As presented in Appendix 1, the experimental settings in the course included multiple next to each other tasks, which on the other hand had significant level of interdependence. It seems that this kind of rather complex setting was causing confusion among the course participants. Comments such as hard to keep up and confusing were raised by half of the students. These results indicate a clear need to have a good support materials and hands on guidance for students regarding studying tasks and learning methods.

On the other hand learning curve to use Massidea.org as collaborative online tool was rapid. Only 3 students indicated difficulties to use the platform, yet two of them seemed to overcome the challenges after getting to know Massidea.org platform more deeply. Though, as a results of other comments it appears that the platform still suffers from some usability issues and lack of features which users would value. Besides Massidea.org, the innovation process included Skype-meeting with Indian students. This experiment had mixing outcome. About half of the students found Skype collaboration fun and interesting. Those who did not value the Skype collaboration named e.g. bad connection as a reason.

Interview results appeared to be inline with the pre experiment survey results. When students were asked about the benefits of the studying model in general and Massidea.org as platform, the same issues as in the pre experiment survey were raised. Getting new and different viewpoints, learning to share information and communicate with others were raised among respondents. However, the amount and quality of received comments have clear effect on realizing these benefits.

4.3 Action research observations

This case study was based on one-off experimental learning setting, which included students from Finland, France and India. Our aim was to collaborative develop novel service concepts which were grounded on Finnish students personal service experiences (i.e. problems based innovation). From global innovation taxonomy point of view there

are two main options to define innovations: 1) international expansion of national innovation or 2) born global innovations. Strictly speaking our learning setting did not make a clear difference between these two. Based on our observations it would probably help students to better understand the whole learning process if a more clear definition and process comparison between these options would be made. Also the learning and innovation process model will most likely differ between these two options. As a result we must critically evaluate the existing model in Appendix 1 and reconsider the optimal structure in both cases. It also became obvious that these kinds of complex processes requires significantly more detailed support materials and hands on guidance for students. Also when online applications are used for innovation processes, one must make sure that users know how to use the application, even if it is simple and learning curve is rapid.

The third taxonomy class – *joint venture* – emphasizes the long-term partnerships between two or more partners. Rater soon it became clear that matching course timetables and task between different courses will require a lot of efforts. Also evening finding a suitable partner and course will require significant resources if these kind of collaboration becomes more frequent. As a result there seem to be a room for matchmaking application, which would help different courses to find each other and stimulate international collaboration.

Both pre experiment survey and post experiment interviews indicated that getting new and different viewpoints, learning to share information and communicate with others are the key motivation factors for students. However, in order to realize these benefits requires a studying model, which will ensure a good amount of quality feedback and comments for individual students. Since online users are typically just observing and not actively commenting or producing contents, learning models should include clear supporting task for these issues. In practice for studying purposes one should e.g. define named number of comments which each student have to produce during the experiment. Also combing asynchronous written communication method such as writing comment on web site and direct verbal feedback via video meetings such as Skype will enrich the communication and reveal students skills. Especially the direct verbal feedback via Skype from people having significantly different cultural background and accent will cause stress and uncertainty among some of the students.

Our learning experiment was conducted with first year students. There are some indications that this level complex learning setting which include foreign language, new learning methods and unfamiliar topic, might be too much for some students. Also the change from traditional “lecturing” to open innovation based international collaboration as a course tasks raised some mental resistance. If the basic capabilities such as language and technology skills are not strong, conducting virtually supported intercultural innovation course will definitely generate difficulties. Therefore it is suggested capabilities for these kinds of complex approaches will be systematically and gradually build during the preceding studies.

5 Conclusions

As a result of globalization, collaborative working methods such as virtual teams have become valuable asset for organizations. Therefore it is increasingly important to learn how to innovate in a virtually supported intercultural environment. This study presented a limited pilot case for constructing virtual supported intercultural open

innovation learning process for higher education context. These kind of concrete examples and the derived best practices and identified booby traps based on practical observation are valuable for developing novel innovation teaching methods. Since our experimental setting was very limited both in sample size and content wise, it suggested that the future studies will evaluate this complex phenomenon in more detail.

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Appendix 1: Detailed Experimental Setting Description

<i>Phase</i>	<i>Description</i>
<p>Phase 1: Preliminary assignment before first contact day: Building up the theoretical background.</p>	<p><i>Theory building:</i> Find recent scientific articles from research journal databases and choose five (5) most interesting articles.</p> <p><i>Applying theory in practice:</i> Write a short narrative story which combines at least one of the theoretical issues presented in selected articles with your personal service experiences either as a customer or as a service provider. Bring your narrative to the first contact day.</p>
<p>Phase 2: First contact day: Introducing Massidea.org and the course structure and objectives.</p>	<p><i>Theory building:</i> The theoretical background and the benefits of mass innovation in general and especially in the context of Massidea.org virtual platform were presented to the students.</p> <p><i>Instructions to use Massidea.org:</i> The students were given instructions how to use Massidea.org and an explanation of Massidea.org’s “press release” - format for writing challenges, ideas and visions of the future.</p> <p><i>Building up capabilities for intercultural collaboration:</i> Discuss and define the guidelines for giving constructive feedback in teams of 3 students. Each team presented their thoughts to the whole course. These suggestions were then collectively summarized into constructive feedback guidelines, which we agreed to follow among the students.</p> <p><i>Applying theory in practice:</i> Write one intercultural challenge to Massidea.org by following the given content writing criteria. Comment each other’s challenges by following the agreed constructive feedback guidelines.</p> <p><i>Intercultural collaboration:</i> In addition to the Finnish course participants, students from France contributed to the task by giving comments to challenges made by Finnish students to Massidea.org.</p>

Table continues in the next page.

Phase 3: <i>Second contact day:</i>	<p><i>Theory building:</i> A lecture presented various theoretical backgrounds relating intercultural issues.</p> <p><i>Applying theory in practice:</i> Note the constructive feedback from others regarding your Massidea.org challenge description. Write an idea to Massidea.org which will provide a solid solution to the challenge which you have previously identified. When writing your idea, notice also theoretical issues which have been presented during lectures and in scientific articles, which you have previously read. Also comment each other's ideas by following the agreed constructive feedback guidelines.</p> <p><i>Intercultural collaboration:</i> In addition to the Finnish course participants, students from France contributed to the task by giving comments to ideas made by Finnish students to Massidea.org.</p>
Phase 4: Third contact day: Marketing own ideas	<p><i>Theory building:</i> Understanding the basics of idea screening: Promote your idea to others in groups of 3 and try to convince them that your idea should be developed into a concept draft. The students were then encouraged to choose the best 3 to 5 ideas in the entire class and then decide which team they would like to join themselves.</p> <p><i>Intercultural collaboration:</i> After choosing the best ideas, the students had a Skype-meeting to India. During the Skype meeting the chosen 3 ideas were presented to a group of Indian students. The aim was to get feedback from students having complete different cultural background and ask help from them for the next phase studying task (i.e. concept development). The Indian students gave their comments and feedback verbally based on what they heard. It was also agreed that the Indian students would elaborate their comments in written format to Massidea.org.</p> <p><i>Team working:</i> Form multiple groups each having no more than 3 students. Collaborate with your team mates and start expanding one of the selected ideas to a concept draft.</p>
Phase 5: Group Workshops: Students working independently with each other	<p><i>Team working:</i> Start developing and writing together a preliminary concept description for chosen idea with your team mates. Publish the first concept version in Massidea.org and comment other group's concept drafts as you have done in the case of idea and challenge descriptions. Review the feedback given to your group and use it for developing your concept further. Submit the final version of the concept to Massidea.org. Prepare elevator speeches about your concept for the company representatives.</p>
Phase 6: Final presentations and meeting company representatives	<p><i>Marketing skills:</i> Concepts grounded on the best selected ideas were presented to the group of company representatives. Each group presented their own concept as elevator speeches to company representatives and attempted convince them about the goodness of their concept. After each presentation the representatives were encouraged to give comments to the groups and evaluate the possibility to start developing the presented concepts in collaboration with students..</p>

Appendix 2: Pre experiment results – motivation factors ranking (N=15)

<i>Variable</i>	<i>Classification by Muhdi and Boutellier (2010)</i>	<i>Mean</i>	<i>Std.Deviation</i>
13. To get feedback from others	Learning	5,20	1,521
12. Make my own insights visible	Sense of efficiency	5,07	1,580
15. Gather new viewpoints	Learning	4,87	1,506
11. Share my knowledge with others	Social aspect	4,73	1,580
16. Further develop my insights	Sense of efficiency	4,67	1,345
2. Due to constructive atmosphere	Sense of efficiency	4,60	1,183
14. To generate new contacts		4,47	1,922
3. Interesting content/partners	Learning	4,40	1,454
19. Collaborate with others	Learning	4,40	1,682
18. Self development	Sense of efficiency	4,33	1,799
17. Trigger my creativity	Sense of efficiency	3,87	1,457
5. Monetary rewards	Rewards	3,33	1,988
9. To build up my career	Social aspect	3,20	1,971
4. Sense of community	Social aspect	3,13	1,885
1. Have fun	Rewards	2,87	1,807
10. To compete with others	Competition	2,47	1,457
6. To get recognition	Rewards	2,47	1,552
7. To win prices	Rewards	2,40	1,502
8. To become famous	Social aspect	1,80	,941