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A study on the success of group formation and cohesiveness in virtual teams using computer-mediated communications

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Abstract

While the Internet is a major business tool nowadays, individuals are still challenged to form teams and collaboration virtually. To evaluate the success of team formation in a virtual setting, this research study assessed the role of different computer-mediated communications (CMC) employed on the success of team formation measured by task performance (TP), team cohesiveness (TC), computer skills (CS) and social bond (SB), while assessing the differences on such relationships when controlled for gender, age, education level, academic major, as well as academic year. This research used analysis of variance (ANOVA) and analysis of covariance (ANCOVA) to address the hypotheses proposed. Using three teams and 140 participants, the results indicated that there is a significance difference in the role of CMC levels employed on the level of perception of CS in team formation. Also, there is a significance difference in the role of CMC levels employed on the levels of TP, when controlled for gender. In addition, there is a significance difference in the role of CMC levels employed (No-CMS/F2F, OLS, & OLS+SNS) on the levels of CS, when controlled for education, academic major and academic year. The results of this study contribute to the body of knowledge by helping organizations identify ways to support effective team formations.

Keywords: Team formation, computer-mediated communications in teams, social networking sites in teams, virtual teams, team cohesion, task performance

Introduction

Individuals around the world are using social networking sites (SNS's) such as Facebook®, and Twitter® to interact with friends or family. Experts who responded to a survey about the future of the Internet said, "the use of email, social networks, and other online tools offers low-friction opportunities to create, enhance, and rediscover social ties that make a difference in people's lives" (Quitney & Rainie, 2010, p. 1). College students are heavy users of the Internet, and communication over SNS has become standard among them. The role of the Internet in the lives of individuals goes beyond being merely a method of communication; it has become an integral part of their daily lives and their social interactions (McMillan & Morrison, 2006).

Weaver and Morrison (2008) defined an SNS as a Website that "allows users to post their profiles and create personal networks for exchanging information with other users" (p. 97). The role of SNS is to enable users to articulate and make themselves visible to others via these social networks (Boyd & Ellison, 2007). Moreover, it appears that forming teams in virtual environments both for work and academic purposes appear to be challenging (Agustín-Blas et al., 2011; Anagnostopoulos, Becchetti, Castillo, Gionis, & Leonardi, 2012). Thus, this research study was set forth to investigate the role of CMC levels employed in the success of team formation. According to Christodoulopoulos and Papanikolaou (2007a), "team formation may be used in different contexts, such as in a computer-supported collaborative learning (CSCL) context for grouping users who could potentially benefit from cooperation based on their complementariness of knowledge/skills or competitiveness, or forming groups around problems with specific requirements" (p. 57). Understanding how SNS technology can be used to facilitate the difficult task of forming virtual teams will provide better strategies for supporting team cohesiveness and team performance (Shin & Park, 2009). Hogg and Tinsdale (2001) reported that in workgroups, members' ability to get along with each other (i.e., cohesiveness) is critical to group well-being and task performance. According to Salisbury, Carte, and Chidambaram (2006), "the importance of developing such intra-team cohesiveness has proven to be particularly relevant in cases where members are not familiar with each other" (p. 148). This is also the case for virtual teams, and it appears that additional work in assessing factors and tools that can help fertilize virtual teams formation is highly needed (Malhotra, Majchrzak, & Rosen, 2007; Maynard & Mathieu, 2012). Therefore, the research problem that this research study addressed was the difficulty of team formation and collaboration between individuals in virtual teams (Fransen, Kirschner, & Erkens, 2011; Liccardi et al., 2007; Malhotra et al., 2007; Ounnas, 2008). The main goal of this research study was to assess the role of different CMC levels employed (No-CMC/F2F, Online Learning Systems (OLS), & OLS+SNS) on the success of team formation as measured by the level of task performance (TP), team cohesiveness (TC), social bond (SB), and computing skills (CS), while assessing if there are any differences on such relationships when controlled for demographic information such as gender, age, education level, academic major, as well as academic year.

Review of Literature

The growth of the Internet, coupled with the technological advancements of the last few years, triggered the explosive development of CMC. According to Breakenridge (2008), SNS comes down to the individual; that person has a social network and s/he wants to try to organize friends, essentially because communication is so much easier and quicker these days. Most CMC cater primarily to individualistic or personal motivations and goals (e.g. they allow users to store their pictures, bookmarks, or videos); they facilitate one-to-one or one-to-many communication, and the publishing of ideas (Wever, Mechant, Veevaete, & Hauttekeete, 2007). A CMC, while it enables personal motivation, creates a new kind of almost effortless cooperation. It creates weak ties between casual acquaintances who did not previously have any cooperative action plan or altruistic intention. The success of Web2.0 services reveals the user's hybrid motivation, where the individualization of the user's goals meets the opportunity of sharing personal expression in a public sphere (Wever et al., 2007). These kinds of tools can influence the success of group formation in virtual teams.

Virtual Teams

In terms of *virtual teams*, the literature indicates that this concept has grown and there has been a proliferation of definitions (Martins, Gilson, & Maynard, 2004). According to Lipnack and Stamps (1997), "it was not until the 1990s that the word "virtual" made it into the headlines on a regular basis" (p. 5). Miles and Snow (1986) stated that a virtual team is an evolutionary form of a network organization. The concept is enabled by advances in ICT (Davidow & Malone, 1992; Jarvenpaa & Ives, 1994). *Virtual* implies permeable interfaces and boundaries; project teams that rapidly form, reorganize, and dissolve when the needs of a dynamic marketplace change; and individuals with differing competencies who are located across time, space, and cultures (Kristof, Brown, Sims, & Smith, 1995; Mowshowitz, 1997). Today, virtual teams have become almost indispensable to organizations (Paul & Ray, 2009). According to Paul and Ray (2009), "global virtual teams have now become critical mechanisms for integrating information, making decisions, and implementing plans around the world" (p. 1). In this era of globalization and ever-changing environments, distributed working groups need to develop a competitive advantage. One problem a virtual team appear to remain facing is its formation in this digital environment. People have differences, and in a virtual environment, much of the time, people do not see each other's faces. For this reason, when a virtual team is created, it cannot be determined in advance if the team formation will lead to success.

Team Cohesiveness (TC)

Munkvold and Zigurs (2007) stated, "virtual teams are formed in response to specific needs and typically must perform quickly" (p. 287). They need a rapid start-up, and usually individuals in these virtual worlds are people who have no prior knowledge of the others on the team and they need to work together immediately (Munkvold & Zigurs, 2007). Identifying the correct people to solve a problem efficiently or collaborate with others is a challenging task (Liccardi et al., 2007). Teams are formed for the purpose of performing a task or a series of related tasks (Guzzo & Salas, 1995). Organizations make great efforts to find ways to configure work done in face-to-face teams, and now the formation of virtual teams faces a new level of complexity (London, 2001). Schwanda et al. (2011) stated that "team cohesiveness is a vital social dynamic that is difficult to achieve in virtual teams" (p. 709). They also indicated that members of highly cohesive groups tend to be more satisfied with their experience than those in less cohesive groups. Powell et al. (2004) stated that "high levels of communication early in the life of virtual teams foster team cohesiveness. High levels of cohesiveness reduce barriers to communication and are instrumental in promoting a virtuous cycle of cooperation" (p. 16). Jarvenpaa and Leidner (1999) indicated that early communication and interaction have lasting effects on trust in the virtual environment.

Social Bond (SB)

Social bond theory has remained a major paradigm since its introduction in 1969 (Pratt, Franklin, & Gau, 2011). According to Hirschi (1969), virtually all existing criminological theories began with a faulty fundamental premise: that criminal behavior requires the creation of criminal motivation. Hirschi (1969) postulated that all of us possess the drive to act in the kinds of selfish and aggressive ways that lead to criminal behavior and that it is part of our innate human nature. The question that Hirschi (1969) asked was, why the rest of the population does not participate in that criminal behavior? According to Pratt et al. (2011), "for Hirschi, the answer could be found

in the bonds that people form to prosocial values, prosocial people, and prosocial institutions" (p. 58). It is these SBs that end up in controlling human behavior when they are tempted to engage in criminal or deviant acts (Hirschi, 1969). These bonds come in four interrelated forms: attachment, commitment, involvement, and belief (Pratt et al., 2011). Attachment, according to Hirschi (1969), refers to the level of psychological affection one has for prosocial others and institutions. Pratt et al. (2011) explained that, "for Hirschi, parents and schools were of critical importance in this regard, where youths who form close attachments to their parents and schools will, by extension, experiment greater levels of social control" (p. 58). Commitment is the second type of SB where people value social relationships, which they would not want to risk jeopardizing by committing criminal or deviant acts (Hirschi, 1969). Hirschi (1969) explained that people are less likely to misbehave when they know that they have something to lose (Pratt et al., 2011). According to Pratt et al. (2011), involvement relates to the opportunity costs associated with how people spend their time. If people are spending their time engaged in some form of prosocial activity, then they are not, by definition, spending their time engaged in antisocial activity (Hirschi, 1969). Pratt et al. (2011) described the final type of social bond identified by Hirschi (1969):

> as the degree to which one adheres to the values associated with behaviors that conform to the law: the assumption being that the more important such values are to a person, the less likely he or she is to engage in criminal/deviant behavior. (p. 59)

Task Performance (TP)

According to Triplett (1898), children showed more effort on a coactive task when other children were present, compared with situations where they were performing alone. While it is generally accepted that virtual teamwork has considerable cost and flexibility benefits, there is some question whether the benefits outweigh possible performance losses arising from virtual versus F2F work (Corbitt, Gardiner, & Wright, 2004). According to Corbitt et al. (2004), "computer mediated groups tend to perform better than F2F groups on idea generation tasks but worse on more complex tasks with computer-mediated groups typically having longer task completion times" (p. 3). Optimal team composition in virtual settings may be different from traditional teams (Turel & Zhang, 2010). Sproull and Kiesler (1986) stated that virtual teams lack the timely verbal cues and facial expressions that prevail in face-to-face team interactions and, as such, find it more difficult to become cohesive and to perform well. According to Chidambaram and Tung (2005), virtual teams often present heightened levels of social loafing and frequently struggle to build trust and relationships among team members (Jarvenpaa, Knoll, & Leidner, 1998), which are crucial for team performance (Lin et al., 2008). Given these attributes, whereas in traditional teams loose leadership may suffice, strong emergent leadership may be required in virtual settings to prevent the prevalent phenomenon of social loafing that will affect a virtual team's TP (Chidambaram & Tung, 2005).

Computing Skills (CS)

In today's computing environment, "the bottom line is not how good information systems (IS) are, but rather how well they are used" (Torkzadeh & Lee, 2003, p. 607). As computing technology is used in one form or another in all fields, it is imperative that individuals have proficiency in the area of computing technologies (Hanebutte, 2013). According to Hanebutte (2013), "the level of computing technology literacy does not appear as high as expected from

industry, and individuals are not as comfortable with the use of computing equipment as they were a few years ago" (p. 87). Effective use of computing technology is considered by Torkzadeh and Lee (2003) a "major determinant of economic growth, competitive advantage, productivity, and even personal competency" (p. 607). Computing skills influence how well computing technology is used by individuals. As an example, individuals understand how to use a Web browser. However, according to Hanebutte (2013), beyond the knowledge of understanding how to use a Web browser, there is often very little comprehension about how Web pages are transported and displayed. According to Fernandez (2009), "successful computing professionals will need personal skills and developing the personal skills in organizations will be very important" (p. 111).

Research Methodology

This study was exploratory using survey methodology to assess the role of the three different CMC levels employed on the success of team formation as measured by the level of four aforementioned constructs (TP, TC, SB, & CS), while assessing if there are any differences on such relationships when controlled for some demographic variables. Three groups were compared: Group A (F2F), Group B (OLS), and Group C (OLS+SNS). Group A included individuals from an on-campus course, forming groups F2F in class to work on some tasks, and will serve as the control group for the proposed research. Group B included individuals from an OLS, forming groups assigned by the professor in virtual teams using a traditional discussion board online to work on the same tasks in the system. Group C included individuals from an OLS, forming groups in virtual teams using SNS to work on the same tasks in the system using a discussion board provide by the OLS. The hypotheses are represented in the conceptual model for team formation success (Figure 1).

The hypotheses that this study addressed were (in the null form):

H1: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the level of *TP* in team formation.

H2: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the level of perception of *cohesion* in team formation.

H3: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the level of perception of *SB* in team formation.

H4: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the level of perception of *CS* in team formation.

H5: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the success of team formation as measured by the levels of *TP*, perception of cohesion, perception of *SB* and perception of *CS* when controlled for demographic information such as *gender, age, education level, academic major*, as well as *academic year*.

More specifically:

H5a: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *gender*.

H5b: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *age*.

H5c: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *education level*.

H5d: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *academic major*.

H5e: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *academic year*.

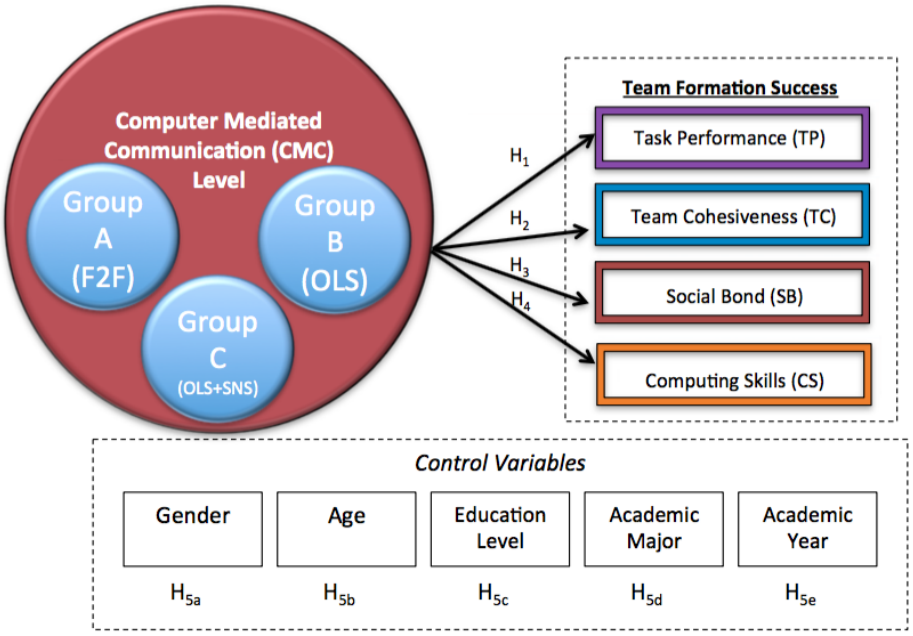

Figure 1. Conceptual Model for Team Formation Success

Results

There were 143 responses received from the survey respondents. Before the collected data could be analyzed, pre-analysis data screening was performed to detect irregularities with the collected data. According to Levy (2006), pre-analysis data screening is performed to ensure the accuracy of the data collected, to eliminate cases with response-set, check for missing data, and to deal with extreme cases or outliers. For this study, data accuracy was not an issue as the Web-based survey instrument was designed to allow only a single valid answer for each question.

Additionally, data collected did not require any manual input as it was submitted into a Web form directly into a spreadsheet prior to the analyses. The issue of missing data was also not present for this study as the Web-based survey instrument was constructed in a way that all items were required. To address the issue of response-sets, a visual inspection of all responses was performed to identify cases that had the same response to all of the survey items. Response-set bias produces pattern of responses that may not correctly correspond to the true stat of affairs (Mangione, 1995). According to Kerlinger and Lee (2000), it is recommended that researchers do analysis of data for potential response-sets, and consider the elimination of any such sets from the research prior to the main data analysis. In this study, there were three response-set cases in the collected data and they were eliminated due to their severity of including the same score on all measured items, indicating the participants did not faithfully answered the survey. Another main reason for pre-analysis data screening was to deal with extreme cases or outliers. In order to address multivariate extreme cases, Mahalanobis Distance analysis was performed. No extreme cases were found in the collected data.

After completion of the pre-analysis data screening, 140 responses remained for analysis, with demographics that is similar to that of the general sample targeted. Of which, 111 or 79.3%, were completed by females and 29 or 20.7% were completed by males. Analysis of the ages of respondents indicated that 127 or 90.8% were between 19 to 29. Respondents with associates degrees are 33.6% of the population while bachelor's degrees are 31.4%. Overall, 98 respondents or 70% had a university degree prior studying in the program that they have enrolled in the School of Health Professions, 92 or 65.7% were enrolled in an undergraduate program and 85 or 60.7% had one year or less in the program that they have enrolled. Details of the demographics of the population are presented in Table 1. As noted before, the population was randomly divided into three groups. This proposed research compared the three groups: Group A, Group B, and Group C. Details of the demographics of the population of each group are presented in Table 2.

Table 1. Descriptive Statistics of Population (N=140)

Item	Frequency	Percentage (%)
Gender		
Male	29	20.7%
Female	111	79.3%
Age		
18 or under	0	0%
19 to 24	95	67.9%
25 to 29	32	22.9%
30 to 34	5	3.6%
35 to 39	2	1.4%
40 to 44	1	0.7%
45 to 54	4	2.9%
55 to 59	0	0%
60 or older	1	0.7%
Academic Level		
High school diploma	42	30.0%
Associates degree	47	33.6%
Bachelor's degree	44	31.4%
Master's degree	6	4.3%
Professional degree	0	0%
Doctoral degree	1	0.7%
Program Enrolled		
Undergraduate	92	65.7%
Graduate	48	34.3%
Years in the program of study		
1 year or less	85	60.7%
2 to 5 years	54	38.6%
6 to 9 years	0	0%
10 years or longer	1	0.7%

Table 2. Descriptive Statistics for each group in population

	Group A (N=44)		Group B (N=47)		Group C (N=49)	
Item	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
Gender						
Male	14	31.8%	5	10.6%	10	20.4%
Female	30	68.2%	42	89.4%	39	79.6%
Age						
18 or under	0	0%	0	0%	0	0%
19 to 24	35	79.5%	24	51.1%	36	73.5%
25 to 29	7	15.9%	18	38.3%	7	14.3%
30 to 34	1	2.3%	2	4.3%	2	4.1%
35 to 39	0	0%	0	0%	2	4.1%
40 to 44	0	0%	1	2.1%	0	0%
45 to 54	1	2.3%	2	4.3%	1	2.0%
55 to 59	0	0%	0	0%	0	0%
60 or older	0	0%	0	0%	1	2.0%
Academic Level						
High school diploma	26	59.1%	16	34.0%	0	0%
Associates degree	13	29.5%	3	6.4%	31	63.3%
Bachelor's degree	5	11.4%	22	46.8%	17	34.7%
Master's degree	0	0%	6	12.8%	0	0%
Professional degree	0	0%	0	0%	0	0%
Doctoral degree	0	0%	0	0%	1	2.0%
Program Enrolled						
Undergraduate	38	86.4%	24	51.1%	30	61.2%
Graduate	6	13.6%	23	48.9%	19	38.8%
Years in the program of study						
1 year or less	22	50.0%	29	61.7%	34	69.4%
2 to 5 years	22	50.0%	18	38.3%	14	28.6%
6 to 9 years	0	0%	0	0%	0	0%
10 years or longer	0	0%	0	0%	1	2.0%

The study used Principal Component Analysis (PCA) to uncover how many components to retain and interpret and validate the construct measures. The Statistical Package for the Social Sciences (SPSS) software was used to run the PCA for the extraction of components to provide variances of underlying factors (Mertler & Vannatta, 2013). Using Varimax rotation via PCA this study initially extracted as many factors as indicated by the data (Child, 2006). The results of the PCA factor analysis suggested that four factors with a cumulative variance of 82.79% should be retained. Using the factor loadings, survey items were scrutinized for low loadings (< 0.4) or for medium to high loadings (˜0.4 to 0.6) on the four factors. The results of this review indicated that three items could be eliminated from further analysis due to low factor loadings. Consequently, the final analysis excluded one item of SB and two items of TC. For the SB, SB1 item was removed. For the TC, TC1 and TC3 were removed. Table 3 presents the finalized rotated component matrix of SPSS using Equamax as the rotation method with four components.

Table 3. Rotated Component Matrix using Equamax as the rotation method

	Component			
	1	2	3	4
TP2	.841	.265	.169	.337
TP3	.803	.275	.212	.359
TP1	.793	.302	.264	.314
TP4	.786	.272	.226	.351
TP5	.743	.255	.240	.422
SB5	.289	.807	.175	.256
SB3	.166	.795	.140	.351
SB7	.240	.778	.264	.291
SB2	.224	.730	.273	.362
SB6	.361	.704	.340	.272
SB4	.503	.593	.182	.361
CS3	.049	.146	.900	.151
CS1	.086	.127	.865	.136
CS5	.216	.216	.851	.143
CS2	.226	.267	.841	.098
CS4	.371	.163	.730	.236
TC6	.375	.190	.065	.836
TC5	.138	.376	.225	.759
TC4	.456	.321	.182	.650
TC2	.518	.422	.189	.566

As part of the data analysis, the reliability of the four constructs that made the Team Formation was verified using Cronbach's Alpha (Cronbach, 1951). Gefen, Straub, and Boudreau (2000) defined Cronbach's Alpha as the commonly used measure for the concept of reliability, for a set of two or more construct indicators (or survey items). According to Boudreau, Gefen, and Straub

(2001) as well as Straub (1989), Cronbach's Alpha levels of 0.7 and above have been reported to indicate strong reliability for the constructs. The Cronbach's Alpha analysis indicated that all items supported the reliability of all factors. Furthermore, the Cronbach's Alpha of each factor was 0.901 or higher, indicating very high reliability. Table 4 provides the outcome of this analysis.

Table 4. Cronbach's Alpha Reliability Analysis

Team Formation	No. of Items	Cronbach's Alpha
Task Performance (TP)	5	0.969
Team Cohesiveness (TC)	4	0.901
Social Bond (SB)	6	0.943
Computing Skills (CS)	5	0.934

A one-way analysis of variance (ANOVA) and a one-way analysis of covariance (ANCOVA) were used to analyze the hypotheses. The study used ANOVA to analyze H1, H2, H3, and H4. Table 5 provides an overview of the study results, including the mean square scores of the constructs for the groups along with the ANOVA results. Calculating the means squares for every construct between groups and within groups SPSS obtained a significance of the F ratio or *p* value for TC was 0.224 that tells that there is no significance difference between groups. For SB, the significance of the F ratio or p value was 0.121. This also tells that there is no significance difference between groups but also tells that additional research with this construct will be needed. TP also does not have a significance difference between groups. The significance of the F ratio or *p* value was 0.740. Finally, for CS SPSS obtained a significance of the F ratio or *p* value of 0.039. This construct has a significance difference.

Table 5. ANOVA Results for Team Formation

	ANOVA			
Constructs	**Mean Square between groups**	**F**	**Sig.**	
TC	3.496	1.511	0.224	
SB	4.100	2.146	0.121	
TP	0.659	0.302	0.740	
CS	5.545	3.329	0.039	*

***** - p<0.05, ****** - p<0.01, ******* - p<0.001

Looking at all constructs and their results, this study determines that the construct of Computing Skills (CS) has the most significance difference, compared to the other ones. Figure 2 presents the means and standard deviations of the aggregated composite score. ANCOVA was used to analyze H5. According to Mertler and Vannatta (2013), "ANCOVA is similar to one-way analysis of variance (ANOVA) in that two or more groups are being compared on the mean of

some dependent variable, but ANCOVA additionally controls for a variable (covariate) that may influence the dependent variable" (p. 15). Looking at the results of the analysis, it was determined that gender was significance when compared with the other ones using TP Means as the dependent variable with a *p* value of 0.039. Noticed that because education had a *p* value of 0.103 with TP Means as the dependent variable, more research can be done in this area. Also, Academic Major using CS Means as the dependent variable was the most significance covariate when compared with the other ones, with a *p* value of 0.002. Education and Academic Year using CS Means as the dependent variable were significance also with a *p* value of 0.034 and *p* value of 0.016 respectively. Table 6 provides the outcome of the ANCOVA analysis. Moreover, summary of all the results of the hypotheses are outlined in Appendix A.

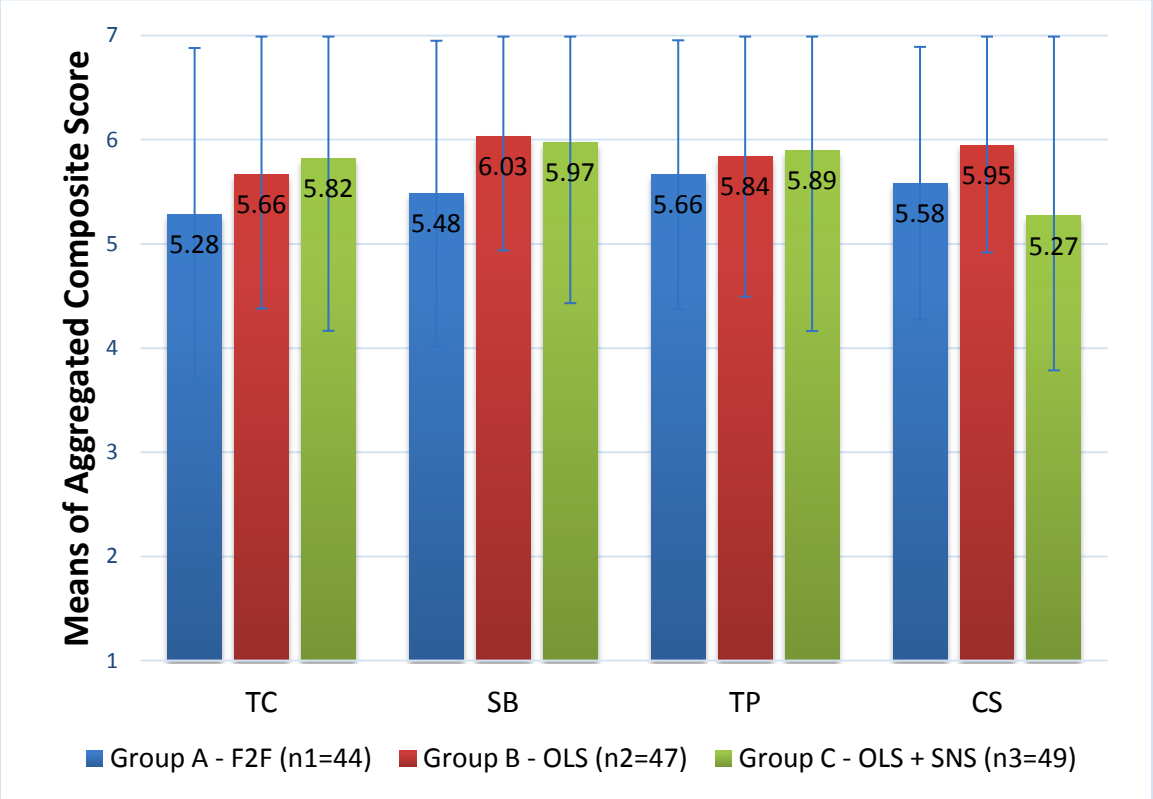

Figure 2. Figure for the Means and Standard Deviations of Aggregated Composite Score

Table 6. ANCOVA Results for Team Formation and Demographics Covariates

	ANCOVA									
	TP Means (DV)			TC Means (DV)		CS Means (DV)			SB Means (DV)	
Demographics	**F**	**Sig.**		**F**	**Sig.**	**F**	**Sig.**		**F**	**Sig.**
Gender	4.755	**0.039**	*	0.821	0.373	0.005	0.945		0.089	0.768
Age	0.080	0.780		0.479	0.495	0.189	0.666		0.696	0.411
Education	2.859	0.103		0.048	0.828	4.826	**0.034**	*	0.336	0.567
Academic Major	0.187	0.669		0.567	0.458	10.918	**0.002**	**	0.320	0.576
Academic Year	2.253	0.146		0.905	0.350	6.329	**0.016**	*	0.323	0.574

***** - p<0.05, ****** - p<0.01, ******* - p<0.001

Conclusions, Implications and Recommendations for Future Research

Overall, the results indicated that there is a significance difference in the role of CMC levels employed (No CMC/F2F, OLS, OLS+SNS) on the level of self-reported of CS within team formation. Also, there is a significance difference in the role of CMC levels employed (No-CMC/F2F, OLS, & OLS+SNS) on the levels of TP, when controlled for gender. In addition, there is a significance difference in the role of CMC levels employed (No-CMS/F2F, OLS, & OLS+SNS) on the levels of CS, when controlled for education, academic major and academic year. As with any research study, this study also had some limitations. One of the main significant limitation of this study was the generalizability of the sample. It was limited to an educational environment, so generalizability to a work setting may be limited as well. The university where the study was conducted had limited participant to students taking online classes offered by the School of Health Professions. Therefore, the total population size is limited; it was not limiting the size enough to preclude the study. Another limitation is the CMC that were used. In the future, other CMC can be developed and other SNS can arise and be used more by people than the Facebook platform.

This research study has some implications for the existing body of knowledge in the area of team formation and virtual teams. Organizations are continuing to use the Internet as a source to team formation in virtual environments. The results of this study contributed to the body of knowledge for both practice and research, to help organizations identify ways to support effective team formations. The most interesting finding that this study present is that basically it did not really have a major significance difference between the groups. Originally, the study assumes that TC, SB, TP and CS will have significance difference between the groups. In the end, the study did not get that. With the findings, it is possible that students in Group A (No CMC/F2F) were using mobile devices to communicate between them and the study did not consider this.

This current study compared with other studies like the work of Joe, Tsai, Lin, and Liu (2014) that they used TP as one of the construct in their model to measure team performance to

determine the success of team formation. This research study outlined a conceptual model for team formation success. Because three out of the four main null hypotheses were not rejected, future research is needed to investigate the construct of TC, SB, TP, and CS. Particularly SB that had a p value of 0.121, this indicate that more research is needed to further investigate this particular construct. Probably, future research can try other types of populations. Also, future studies are warranted to increase the validity of the instrument. In addition, more research is needed to expand the sample size and the use of other organizations to increase the generalizability. While this research study concentrated on an educational organization, future research could include assessing other organizations and industries.

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Appendix A. Summary of Hypotheses Results

Hypotheses	Results
H1: There will be no significant difference in the role of CMC levels employed *(No CMC/F2F, OLS, OLS+SNS)* on the level of *TP* in team formation.	Fail to reject
H2: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the level of perception of *cohesion* in team formation.	Fail to reject
H3: There will be no significant difference in the role of CMC levels employed *(No CMC/F2F, OLS, OLS+SNS)* on the level of perception of *SB* in team formation.	Fail to reject
H4: There will be no significant difference in the role of CMC levels employed *(No CMC/F2F, OLS, OLS+SNS)* on the level of perception of *CS* in team formation.	Rejected
H5a: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *gender*.	Partially Rejected (For TP construct rejected. For cohesion, SB and CS construct, not rejected)
H5b: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *age*.	Fail to reject
H5c: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *education level*.	Partially Rejected (For CS construct rejected. For cohesion, SB and TP construct, not rejected)
H5d: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *academic major*.	Partially Rejected (For CS construct rejected. For cohesion, SB and TP construct, not rejected)
H5e: There will be no significant difference in the role of CMC levels employed *(No-CMC/F2F, OLS, OLS+SNS)* on the levels of *TP*, perception of *cohesion*, perception of *SB*, and perception of *CS* when controlled for *academic year*.	Partially Rejected (For CS construct rejected. For cohesion, SB and TP construct, not rejected)

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