Networked Flow in Blended Learning Settings: a Longitudinal Mixed-Method Study

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Abstract. We investigated the process of Networked Flow (NF) in 10 self-selected learning teams (graduate students enrolled in an academic course on Enterprise Communication) collaborating in blended settings. The NF model suggests that teams reach maximum group creativity when participants experience high levels of flow and social presence. Moreover, the model predicts that emergence of NF is associated with specific group structural dynamics. The research protocol consisted in a longitudinal mixed-method design, which integrated: (i) the analysis of experiential features of collaborative experience (flow, social presence); (ii) the analysis of communicative interaction; (iii) the structural features of collaboration dynamics (social network indexes). Preliminary findings suggest the feasibility and potential usefulness of integrating quali-quantitative methods for the investigation of NF in creative collaboration settings.

Keywords. Networked Flow, Group Creativity, Flow, Social Presence, Social Network Analysis, Conversation, Illocutionary Analysis

1.Introduction

In recent years, several authors have emphasized the importance of collaboration in promoting creativity. Recently, Gaggioli et al. [1] introduced a new theoretical and methodological approach to study optimal group collaboration: Networked Flow (NF).

This model holds that maximization of creativity requires the establishment of an optimal group experience, in which individual intentions inform and guide collective goals. Specifically, the experience of group flow [2, 3] combined with highest levels of social presence (i.e., the sense of being in the same place with another person) [4-6] promote a *shared collaborative inter-subjective space* able to maximize group

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potential. Further, the model predicts that emergence of this shared optimal experience is associated with specific group structural dynamics, which can be investigated using social network analysis technique.

2.Methodology

The NF model holds that optimal group collaboration is a multifaceted process which can be associated to specific group structures. Specifically, it proposes that the emergence of NF entails two levels of analysis: (i) the experiential level (quality of group experience, in terms of flow and social presence); (ii) the structural level (social network structure and patterns of communicative interactions [7]).

The present study involved 102 participants (graduate students enrolled in an academic course on Enterprise Communication). The overall sample included 21 males and 81 females (average age = 22.98, SD = 1.69). Participants formed 10 self-selected teams (mean team size = 10.24; SD = 1.28) who collaborated over 11 weeks in blended setting (involving both face-to-face and virtual meetings). Groups were tasked with elaborating a joint project (the production of a videoclip concerning a topic addressed by the course). Quantitative measurements included: (i) self-report instruments to address the experience of flow (*Flow State Scale*; [8]) and social presence (*Networked Mind Social Presence Inventory*; [4, 5]); (ii) data gathered from online communications, which were subsequently analysed using Social Network Analysis. Finally, communicative interactions (both face to face and mediated conversations) were studied using a multi-perspective approach to conversation, which allowed identifying indicators of group optimal experience.

3.Results

3.1. Quantitative data

To illustrate the methodology, we focus our analysis on group 10, which showed the highest levels of flow and social presence (Flow mean: 124.33; S.D. = 7.54; Social Presence mean = 74.37; S.D. = 3.99). SNA data were used to describe group's structural dynamics. Figure 1 illustrates changes of group structure across 8 weeks of collaboration (from week 4 to week 11). Specifically, we examined changes in social network indexes of: Density (the ratio between the interactions activated and received by each members of a group); In-Degree Centralization (a measure of members' "status"); Out-Degree Centralization (a measure of members' "influence"), and CPI (an indicator of "structural social presence" [9]).

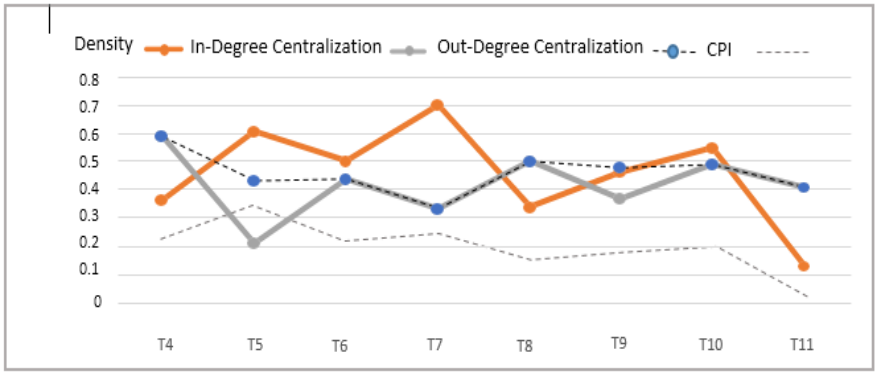

Figure 1. Changes of group structure across 8 weeks of collaboration (from 4th to 11th week).

Results shows that the central weeks of collaboration (from week 4 to week 7) are the most relevant for the emergence of a clear group structure. In this interval, the leadership was homogeneously distributed among members (as indicated by In-Degree Centralization and Out-Degree Centralization values) and exchanges occurred among all members equally (as indicated by Density and CPI values). On the other hand, new leadership structure formed towards the end of the course (from week 9 to week 11).

3.2. Qualitative data

Two recordings from the first and a half-way group meeting were considered to identify macro-sequences of problem solving or creative (idea-generating) processes. Ten sequences were identified and three sequences from the first meeting and one from the half-way meeting were selected to be transcribed using the system developed by Sacks et al. [10]. The analysis of these sequences are still ongoing but preliminary results allowed to identify patterns of communicative interactions that may have fostered the high levels of Networked Flow measured in the quantitative phase of the research. Extracts from the sequences are used here to exemplify the obtained results.

The analyses show that Group 10 used the same pattern of 'accumulation' of ideas across meetings, and that this process is mainly managed by two types of figures: one is present at time of the recorded meetings and is the functional leader of the team; the other one is absent but presentified through the other participants' discourse and his 'fictional' presence is used by the group to regulate decision making processes. This second type of regulator can be an absent team member or a person external to the group (in the example below the regulating figure is the professor of their class):

1 E But I think that he ((the professor)) wants us to use music because in my opinion because he – (.) but we - he is
2 Introducing music to us, it's jazz and he linked jazz to organizations, to enterprises, to business
3 etcetera, etcetera – thus perhaps he – thus he brings in music bands for us, otherwise he could have brought in
4 even a painter – [and the painter would have done improv
5 G [But maybe (0.4) ehm::: a way to demonstrate improv could be
6 I put – a musician and – a painter in the same room and see how they relate to each other = - and I just
7 Ask them "paint according to what you hear or play according to what you see:"

During the first meeting, the group proceeds randomly, it elaborates and discards ideas at a rapid pace without giving themselves time to organize the ideas they have had: time management is not a concern; they have no clear goal.

Basically, the first meeting is characterized by low degree of mono-logical coherence and the constant research of dialogical continuity. Dialogical continuity is fundamental for resolving the assigned task and is to be maintained by the group even if mono-logical coherence is lost: it is important for group development that individual member renounce to make their own ideas or opinions prevail in order for group dialogue to be maintained. The strategy of accumulation and discard is aimed to support this need for exploration and to avoid conflict.

1	G	= and we see ehm: different artists how they react, thus the: [= poet what he writes, the painter what
2		He paints and: [the dancer what he dances:[= and:: that all I think
3	H	[Otherwise you cannot hear
4	E	= th[e painter!
5	H	[Otherwise you cannot hear
6	E	[= Eh!
7		Correct
8	H	[This is so nice!
9	G	[= And:: then-
10	A	[Then (0.3) or we decide on a common theme, not music, a theme
11	G	A theme:
12	H	[But, that is:
13	-	[=
14	B	[Yeah one says to improv on something, instead a theme is focused
15	G	Then, what she is says is ok, but if you do that it's not real group work. I
16		Think that it depends, that i[s= - depends on how you sell it (0.4), meaning-
17	B	= [that is- (0.3) correct that in my opinion if-
18	C	Then in the end there is something made by the group, because everyone is influenced by the same thing
19		So if we rely on the fact that in the end the result is a – group thing (h) it is on point
20	G	In my opinion yes
21	A	Maybe we have to choose ehm: a theme – an idea

During the half way meeting, they still proceed in the same way, by accumulating ideas and proposals, but the group members focus on analyzing each possibility, solving problems, and then moving on another points of the discussion: the group has a specific goal in mind that has to be reached. In this case, dialogical continuity is not perceived as a need to be answered (see the emergence of small oppositions in the dialogue below, which do not appear in the first meeting) but becomes a way for short term mono-logical coherence to emerge: accumulation of topics and ideas is strictly linked to a sequence of problems and their solutions.

1	G	No but: - (s)he is:: shooting us – that is:: for your dissertation, you are studying movie
2		making a[nd thus: you are sticking to me and you stay, come, you shoot us – [and see how it is::
3	I	[Ah ok (h)
4		[And you say "since you are at it,
5		Bring me a coffee" (h)
6		No, ok it's ok
7	H	Correct
8		[No, ok, you can ask a lot of questions
9	-	[=
10	G	[This could be the justifica-
11	E	To her it must be eh-
12	C	Correct you can ask questions [= but for example at the auditions: that is-
13	B	[= you can ask questions-
14	B	And it can be fitting that I look at her and say something like "who's that girl?"=
15	I	Yes
16	-	(h)
17	B	= and you say "ehm:: [is she a ( )" and I say "ah ok"
18	E	[A gatecrasher!
19	F	A gatecrasher (h)

20 D The designer's assistant
21 H That's it, good job!
22 B And what do we write, a student?
23 G [It could work: =
24 C [In my opinion yes
25 F Hey D – ehm:: [we are a bit in a bind, and then – who is usually present at the audition? =
26 G = [it's the only thing that comes to my mind

4. Discussion

To better illustrate the methodology, we focused the SNA and qualitative analysis on the team showing highest level of flow and social presence.

SNA data collected from this group revealed the emergence of a specific interaction pattern during the central weeks of collaboration. This was characterized by a "distributed leadership" and by a "democratic attitude" (i.e., interactions occurred among all members equally). A further observation was the emergence of a leader only towards the end of the collaboration period, probably in order to manage the entire group towards the finalization of the task (i.e. the delivery of the group presentation).

Qualitative analysis of macro-sequences of problem solving and idea-generating processes contributed to further elucidate SNA results, by identifying specific markers of networked flow:

- The ratio between conflicts produced and conflicts resolved;
- Number of group members that take part into the conversation;
- Role fluidity: organizational/institutional roles, enunciative roles;
- Team management processes (problem solving, decision making, etc.) supported by an internal or external (material and/or human) resources
- Type of problems and the created ethnomethods used to solve them
- Number of subroutines that the group cannot solve
- Prevalence of dialogical continuity over monological coherence
- Ratio of successful and satisfied speech acts and the total number of speech acts.

Within the group conversations, it is possible to underline both structural elements, that also emerge from the quantitative analysis, and proper team social psychological functional elements. There are four important levels in conversation [11] that are pivotal to flow:

1. Individual level
2. Conversational level
3. Group level
4. Organizational level.

Each level realizes a different part of optimal experience and it integrates the previous levels. Therefore, to enhance networked flow it is important to consider all the previously mentioned levels and to train people to improve their abilities in level 1-3 (effective communication and team management) and to deal efficiently with level 4.

5. Conclusion

The goal of this contribution was to describe a mixed methodology for investigating the emergence of Networked Flow in a longitudinal observational setting, by examining collaborative teams of students. To illustrate the model, we focused the analysis on the team characterized by highest levels of flow and social presence. Results indicated that the emergence of NF is associated with specific structural indicators. Specifically, social network analysis data showed equal participation of each team member during the collaboration process. Furthermore, the analysis of communicative interaction patterns allowed to identify possible markers of optimal collaboration process (i.e., ratio between conflicts produced and conflicts resolved, role fluidity and others). Overall, these results indicate the feasibility and potential usefulness of integrating quantitative and qualitative methods in the investigation of creative collaboration process.

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