

Online and Face-to-Face Group Interaction Processes Compared Using Bales' *Interaction Process Analysis* (IPA)

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Abstract

Previous, pioneering studies of small-group interaction, conducted in face-to-face environments, have generated a body of literature; however, the usefulness of this knowledge for online groups has not been systematically examined. This paper reports the use of Bales' influential *Interaction Process Analysis* model, originally published in 1950, on the transcript of an computer-mediated discussion conducted by a group of graduate students. The results showed some differences: lower levels of some interaction processes than were found in face-to-face groups, and an almost complete lack of negative socio-emotional interactions (which had comprised 2 to 6% of face-to-face utterances). The group's task focus, and its emphasis on problems of evaluation (addressed by *opinions*) and orientation (addressed by *information*), were consistent with the activities of face-to-face groups, and were judged expected, considering the close presence of the instructor-moderator in the online discussion. While issues of reliability were identified related to coding with the instrument, the IPA itself was found to be useful for describing interaction processes in online groups.

Keywords

Transcript analysis; interaction analysis; CMC moderator behaviour; small-group interaction; social networks; computer conferencing

List of topics

- Background
- Interaction in online groups
- Bales' Interaction Process Analysis (IPA) method
- The study
- Findings
- Discussion
- Conclusion
- References

Background

Interaction in face-to-face small groups has been studied for decades, generating information about decision-making, leadership, task performance, and interaction and intercommunication patterns (Homans, 1950; Bales, 1950; Bales, Strodtbeck, Mills, & Roseborough, 1951; Weick, 1979; Fahy, Crawford, and Ally, 2001; Garrison, Anderson, and Archer, 2001; Bormann, 2003; Gersick, 2003; Henman, 2003; Parker, 2003; Putnam, 2003). In the evolution of the study of interaction in small-groups, the work of Bales is considered especially pivotal. When Bales' work appeared it established an agenda on the sociology of small groups that was to occupy researchers for years, on topics including status, power, and leadership in face-to-face communications (Burke, 2005). In particular, Bales' *Interaction Process Analysis* (IPA) approach to identifying task and interpersonal elements of group interaction (the subject of this paper) was termed "seminal" by Keyton (2003).

Recently, with the commonplace use of computer-mediated communication (CMC) in distance teaching and training of all kinds, questions have arisen about differences and similarities in online and face-to-face small groups, in relation to various contextual, pedagogical, social, interpersonal, and cultural factors (Hillman, 1997; Hirokawa, Cathcart, Samovar, & Henman, 2003; Fahy, 2004a; Schwier, Daniel, & Ross, 2005). The underlying question concerns the degree to which previous research conducted in face-to-face communications situations might apply to online interaction (CMC) (Keyton, 2003; Poole, 2003).

One of the earliest and, as it has turned out, most durable systems for examining face-to-face small-group interaction is Bales' *Interaction Process Analysis* (IPA) model (Bales, 1950). Although sometimes criticized for the exclusiveness of its categories, the IPA has also been recognized as seminal, and "well accepted as a sound method for identifying the communicative functions of group problem-solving and decision-making interaction ... [with] a long history in communication research" (Keyton, 2003, p. 260). The IPA classifies interaction according to its positive and negative socio-emotional content, and the amounts of giving or asking for task-related input. This approach provides insight into group interaction processes, and, in turn, illuminates an important aspect of online communities.

The focus of this paper is the "communications functions" occurring in an online group, compared with those found in the face-to-face groups, as originally reported by Bales. The purpose of the study is first to describe the patterns occurring in an online group, and then to assess how much these resemble those found in small face-to-face groups, as detected by the IPA in Bales' early reports (1950). The analysis may offer insights into important features of both, while allowing conclusions to be reached about the merits of applying face-to-face group interaction research to computer-mediated communications situations.

Interaction in online groups

There is agreement that interaction in learning groups is essential for several reasons, but especially for reducing participants' perceptions of isolation, promoting community, and enabling participants to articulate their thoughts and reasoning processes as part of the learning process (Jonassen, Davidson,

Collins, Campbell, & Bannan Haag, 1995; Kanuka, 2002; Rovai, 2002; Biesenbach-Lucas, 2004; DeTure, 2004; Molinari, 2004). This view recognizes that learning groups legitimately have both social-relational and task purposes (Poole, 2003), both of which must be attended to in healthy groups, and both of which may be served by appropriate amounts and types of interaction. Bales observed that groups seemed to struggle instinctively to find a balance between the need to accomplish their work, and the desire to achieve a harmonious interpersonal climate.

In distance teaching and training, interaction has consistently been seen as requisite to learning. Moore (1991), whose work on the perceived isolation of online learning participants identified and focused attention on *transactional distance*, stated in his seminal paper that dialogue is itself a teaching procedure (p. 3). Others, from various perspectives, have agreed: Kanuka (2002) wrote that meaning-making requires the generation of relationships (p. 81). Molinari (2004), examining the training of nurses, concluded that social connections were central. Senge (1990) used the term *dialogue* to denote the means by which "the whole organizes the parts," and "a new kind of mind comes into being" (p. 241) in the context of "team learning" (p. 10).

In Moore's conception, successful interaction reduces undesirable transactional distance (TD) in learning. TD interacts with learner autonomy, and may be ameliorated by the amount of structure and dialogue present in the learning environment: perceptions of TD rise when structure increases, when more autonomy is demanded of the learner, and in the absence of dialogue.

Distance includes more than geography. As Walther (1996) convincingly argues, spatially separated individuals may overcome all types of distances, and may successfully achieve personal, even *hyperpersonal*, connection, with effective use of appropriate interactions and media. CMC may be highly liberating, when used to minimize barriers and maximize interpersonal effects, "without environmental reality interfering" (p. 33). *Hyperpersonality* implies that some distance interactions produce interpersonal effects superior to those found in some face-to-face groups, because much of the interpersonal "noise" (in the form of various irrelevant "realities") has been removed from the relationship (Davie & Wells, 1992). Key here is the nature and quality of the interaction, elements that to date have only been sketchily described for online situations.

The salubrious effects of interaction on TD are thought by some observers to be generalized, affecting the quality of the whole interpersonal experience supported by technology (Kanuka & Anderson, 1998, p. 60). In the constructivist view, the whole communicative *gestalt*, including the patterns of interaction that comprise the "totality of interconnected mutually responsive messages" (p. 405) generated by the community, is affected by effective media uses. For interaction researchers (and in this study), it is in the *patterns of interaction* of online groups that evidence is sought regarding knowledge production, meaning negotiation, support, and community health (Biuk-Aghai & Simoff, 2004).

Transcript analysis and online group interaction. Research on patterns of interaction in CMC transcripts, seeking clues to the nature and quality of the online learning community, is increasing, and some of the approaches and topics of these studies suggest that use of existing small-group research from face-to-face settings (such as IPA) would be timely (Bruner, 1986; Fahy et al., 2001; Commonwealth of Learning, 1993; Jonassen et al., 1995; Gunawardena, 1999; Jeong, 2004). Though the processes involved in various TA models vary, and problems with the validity of some analytic procedures have been noted (Fahy, 2001; Rourke, Anderson, Garrison, & Archer, 2001; Rourke & Anderson, 2004), reports have appeared in the distance education literature of findings capable of being compared with the existing literature on face-to-face groups (Rourke, Anderson, Garrison, & Archer, 1999; Garrison, Anderson, & Archer, 2000; Garrison, et al., 2001; Anderson, Rourke, Garrison, & Archer, 2001; Fahy, 2004a; Fahy & Ally, 2005; Ally & Fahy, 2005).

While TA models vary, each must address the twin issues of *unitizing* and *categorizing validity* (Keyton, 2003). Unitizing validity refers to the need to identify a reasonably unambiguous unit of transcript analysis. A variety of units have been proposed, functioning with varying (sometimes indifferent) success, including the *turn* (Poole, et al., 1987), *moves* (Hillman, 1997), *units of meaning* (Henri, 1992), *speech segments* (Gibson, 1996), *macrosegments* (Herring, 1996), the *pool of meaning* (Marton & Säljö, 1997), *thematic units* (Anderson, et al., 2001), *message units* (Garrison et al., 2001), *utterances* (Curtis & Lawson, 2001), *message maps* (Gunawardena, Lowe, & Anderson, 1997), and (one suspects a catch-all) *the phenomenological situation* (Giorgi, 1975). It has been argued that categorizing validity (evidenced by coding consistency) is negatively affected by the numbers of codes used, and the excessively fine distinctions sometimes demanded by the more elaborate systems (Fahy, 2001; Rourke et al., 2001; Rourke & Anderson, 2004). As described below, the IPA uses a set of 12 criteria (types of interaction), grouped into 4 categories (describing task and socio-emotional functioning), the internal consistency of which makes it applicable to analysis of transcripts.

To summarize: review of TA research shows that the focus and context reflect both the individual interests of researchers and, methodologically, the relative newness of this source of information for analysis of online groups. While interaction is acknowledged to be central to learning, and analyses are often highly creative, rarely do they seem to be aware of, much less systematically based upon, previous face-to-face group interaction research.

Bales' Interaction Process Analysis (IPA) method

Bales' IPA is a method for analyzing the "systems of human interaction" (1950, p. 257) in, originally, small face-to-face groups. Bales regarded small groups as "partial" or "microscopic" social systems (1950, p. 257), useful for comparing groups of different kinds with each other and for making inquiries into "full-scale social systems."

...it may very well be that one of the main contributions of the study of small groups will be an expanding of the range of available empirical data in such a way as to force our theory of social systems to a more general and powerful level of abstraction. (p. 257)

In this study, an online group and the transcript of its interactions via CMC constitute the "partial" social system for analysis by the IPA model. Understanding them better might, as Bales hoped, extend understanding of a new and important social phenomenon – the online community.

Bales' approach to the analysis of small groups distinguished *process* from *content*, focusing on the former (p. 258):

The heart of the method is a way of classifying behaviour act by act, as it occurs in small face-to-face groups, and a series of ways of analyzing the data to obtain indices descriptive of group process, and derivatively, of factors influencing that process. (p. 258)

The IPA consists of 12 complementary-paired group *processes*; these are further subdivided into four major *functions*, describing communications issues or *problems*, as shown in Table 1.

Table 1. System of process categories in the IPA, related psycho-social group functions, and common communications problems

Function	Process	Paired processes addressing central problems of:
Social-Emotional: Positive Reaction	1. <u>Shows solidarity</u> , raises other's status, gives help, reward	1 & 12 Problems of <i>integration</i>
	2. <u>Shows tension release</u> , jokes, laughs, shows satisfaction	2 & 11 <i>Tension-management</i>
	3. <u>Agrees</u> , shows passive acceptance, understands, concurs, complies	3 & 10 <i>Decision</i>
Task Area: Attempted Answers	4. <u>Gives suggestion</u> , direction, implying autonomy for other	4 & 9 <i>Control</i>
	5. <u>Gives opinion</u> , evaluation, analysis, expresses feeling, wish	5 & 8 <i>Evaluation</i>
	6. <u>Gives orientation</u> , information, repeats, clarifies, confirms	6 & 7 <i>Orientation</i>
Task Area: Questions	7. <u>Asks for orientation</u> , information repetition, confirmation	7 & 6 <i>Orientation</i>
	8. <u>Asks for opinion</u> , evaluation, analysis, expression of feeling	8 & 5 <i>Evaluation</i>
	9. <u>Asks for suggestion</u> , direction, possible action	9 & 4 <i>Control</i>
Social-Emotional Area: Negative Reactions	10. <u>Disagrees</u> , shows passive rejection, formality, withholds help	10 & 3 <i>Decision</i>
	11. <u>Shows tension</u> , asks for help, withdraws out of field	11 & 2 <i>Tension-management</i>
	12. <u>Shows antagonism</u> . Deflates other's status, defends/asserts self	12 & 1 <i>Integration</i>

From Bales, R. F. (1950). A set of categories for the analysis of small group interaction. *American Sociological Review*, 15, p. 258.

The processes (column 2, above) relate to one another through their relevance to the "functional problems of interaction systems" (column 3) (Bales, 1950, p. 259). Column 1, above, shows how the processes and the problems cluster in relation to socio-emotional and task purposes of the group. The problems shown (column 3) are, in Bales' view, potentially present in any group situation. How the group addresses these reveals important facts about its interpersonal workings, structures, and priorities, as a "microscopic" social system.

The IPA model uses what Bales called a "unit of speech or process" (p. 259) as the unit for coding and analysis; apparently, sentences or utterances. (Bales notes that he and his colleagues routinely obtained from 10 to 20 codings per minute in face-to-face interactions [p. 260], a number which corresponds closely to the rate of sentence production in ordinary speech.) In practice, coding was accomplished either with the coder present in situ, or from tape-recordings. Bales considered the IPA applicable to non-verbal elements, though "verbal interaction accounts for the largest part of the [rating] scores" (p. 262).

IPA analysis results in three useful descriptions of group interaction processes: 1) positive or negative social-emotional reactions, and task focus on questions or answers; 2) relative amounts of orientation, evaluation, control, decision, tension-management, and integration behaviours; and 3) relative frequencies of the twelve category types shown in Table 1 (reflecting the communications strategies commonly employed by the group).

The mutually exclusive categories of the IPA, as noted earlier, have been criticized because single codes require that one judgment be made about what may be a subtle and complex statement (Gersick, 2003). On the other hand, the method has also been recognized as ground-breaking, because it identifies the presence and importance in group interaction of both task and relational functions, demonstrated by actual verbal behaviour (Keyton, 2003). As noted below, modifications of the model were made to exploit its strengths, while addressing the potential problems inherent in forced coding of lengthy postings into single categories.

The study

Background. The text transcript of a 13-week online distance-delivered graduate course at a Canadian university was studied. The transcript consisted of approximately 85,000 words, in 534 postings (430 postings, 80.5%, by students; 104, 19.5%, by the course instructor). The CMC system used was proprietary to the university, but was typical of such systems in being text-only, and in presenting messages with the number and titles of messages in the same thread (preserving interrelationships), the numbers and

identities of respondents, and date-time data.

CMC participation. Students participated in the online conference as an assignment in the course, worth 10% of the final grade. The instructions to students in one (typical) course were as follows:

Computer conference [CMC] participation: in 7 of the 9 [course] units, make a minimum of 2 substantive postings (total: 14 postings). The instructor will make initial postings in each unit, to which you may comment, or you may post in response to comments made by other conference participants.

Opening questions or topics, such as the following, were posed by the instructor in each course unit:

- Some distance educators declare that without interaction there can be no education - that education is inherently, necessarily, universally, and fundamentally social. Do you agree? Is there a learning style, a learning condition, a type of content, or an individual learning need which does not always entail a social component?
- The course *Study Guide* points out that "in medicine there is the concept of *iatrogenic disease*: a disease the patient catches from the physician. In education, we have some iatrogenic diseases, too: conditions in our schools and programs which cause illnesses (misbehaviour) in our patients/learners." What iatrogenic diseases have you seen in distance education programs? What causes them, and what can we do about them? Is distance education any better than traditional teaching in preventing these?
- Describe a computer-based technology you have used (as a tutor or a learner) in a distance education or training application, and comment on the outcomes. Especially, what would have improved the outcomes you experienced?

Coding process. Coding was conducted using a modified code-recode protocol. As noted above, reliability in coding is often a problem in TA research (Fahy, 2001; Rourke, et al., 2001). To address reliability, 3 codings occurred (the first a trial event). To address the problem of single codes failing to reflect the complexity of individual postings, multiple codes were permitted (884 codes were applied to the 534 total postings, an average of 1.66 codes per posting).

The first coding of the transcript, using the "process" categories shown in Table 1, took place in summer 2004. After a hiatus of several months, during which the coder (the author) reviewed the initial results, reflected on the model, and considered criteria for better distinguishing the 12 categories, a second coding was conducted in spring 2005. This was followed by a third coding (the "recoding"), in summer 2005. Statistical procedures and calculations were conducted with Microsoft Excel, SPSS, and ATLAS.ti.

Coding reliability was assessed. The following describes the possible assessments that could be applied to the coding of each posting, between the second and third coding events:

- Concordant: all codes agreed; no codes changed.
- Codes added: one or more codes added to previous coding; one or more codes unchanged.
- Codes deleted: one or more codes deleted from the previous coding; one or more codes unchanged.
- Code(s) added and deleted: one or more codes added, one or more codes deleted, or one or more codes unchanged.
- Discordant: no codes matched; previous codes replaced in recoding.

The reasoning applied in this approach to coding was that, while Bales coded spoken utterances, often single sentences, the online transcript consisted of postings containing multiple sentences and paragraphs. Coding every sentence in the transcript was not necessary, as long as all the interaction processes present in the posting were noted. (The presence and the relative proportions of the processes in the corpus were of principal interest.) Coding of the transcript thus reflects all the processes present in each posting, just as the coding of utterances made in face-to-face groups reflects the processes employed by participants in the give-and-take of synchronous interaction, such as were studied by Bales.

Six weeks passed between the final two coding events. Coding was conducted by the author, using ATLAS.ti. Overall, as measured by concordant codes, an agreement level of 67% was achieved between the second and third codings. Table 2 shows how coding evolved over the three events.

Table 2. Coding-recoding results, over three coding events

Reliability results	Coding 1 to 2	Coding 2 to 3
Concordant	42.9	67.3
Code added	9.5	20.4
Code deleted	27.2	5.4
Codes added and/or deleted	11.6	5.4
Discordant	8.8	1.4

The concordant level, reported above, reflects perfect agreement from one coding event to the next. Addition or deletion of a code reflected an effort to recognize nuances, while still leaving one or more of the codes already assigned unchanged. While no priority was attached to the codes (establishing the primacy of multiple codes in any posting that receives more than one is a needed further refinement of this process), in practice codes were almost always added or deleted in response to minor or secondary elements in postings. In only a small number of cases (the 1.4% that were discordant), where recoding replaced all existing codes, did the process result in a completely different classification of the posting. The "reliability" of the coding process may be considered, therefore, to be somewhat higher than the lowest estimate (reflected by the concordant level). (Refining the reliability of the coding process remains a priority of this system.)

Findings

In this section, results of the study are reported in relation to the sample. This is followed by a discussion

of online communications strategies and community characteristics found in the analysis.

Online activity. The group's online activity is described in Table 3.

Table 3. CMC group communications: quantitative description of activity, instructor and students

	Instructor	Males (n = 8)	Females (n = 17)	Student totals (n = 25)	<i>p</i> (students)
Posts: total	104	144	286	430	
Posts: Mean / S.D.	104	18.0 / 11.21	16.8 / 7.89	17.2 / 8.86	.764
Posts: received	202	12.6 / 5.48	12.6 / 6.13	12.6 / 5.82	.989
Posts: average lines	7.8	15.5 / 14.28	16.1 / 14.73	15.9 / 14.57	.678
Posts: sentences	5.13	9.3 / 3.02	9.3 / 3.31	9.3 / 3.16	.980

Contrary to findings reported elsewhere (Herring, 1996; Nixon & Salmon, 1996; Blocher, 1997; Hillman, 1997; Rodino, 1997; Yates, 1997; Fahy, 2002a; Fahy, 2002b), gender was not a factor in participation in this group: men and women posted and received back approximately equal numbers of messages, and produced messages of equal length (in words and sentences). (See Table 5, below, for a description of a small difference related to gender.) The relative presence of the instructor in the interaction was also evident: he made 19.5% of the postings, and almost half of all the posts made by students were addressed to him. However, the instructor's postings typically contained about half the number of lines and sentences as the students' postings.

Positive and negative socio-emotional reactions; questions and answers. In Bales' model (Table 1), demonstrations of solidarity, tension release, and agreement constitute *positive socio-emotional reactions*, while disagreement, showing tension, and antagonism are *negative socio-emotional reactions*. Similarly, *giving* and *requesting* information, opinions, and suggestions are activities related to the group's *task*. Table 4 shows the relative amounts of each of these in the online transcript. In Table 4 (last column), "observed" refers to proportions reported by Bales; the "suggested limits" were extrapolated from his data by Bales for each of these phenomena in his original paper (1950, p. 262).

Table 4. Summary of instructor and student IPA results

Categories	Instructor		Students		Total		Bales' observed, suggested limits
	#	%	#	%	#	%	
A. Positive socio-emotional:							
1. Solidarity	4	4%	39	5	45	5	1%; 0 – 5
2. Tension-release	0	0	6	1	6	1	7.3; 3 – 14
3. Agrees	8*	5	70*	10	78	10	12.2; 6 – 20
TOTAL	12	9%	115	16%	129	16%	
B. Task – giving:							
4. Suggestion	7*	4	6*	1	13	1	5.2; 2 – 11
5. Opinion	42*	27	312*	43	354	40	30; 21 – 40
6. Orientation	40	25	210	29	250	28	21.2; 14 – 30
TOTAL	89	57%	528	73%	617	70%	
C. Task – asking:							
7. Orientation	13*	8	25*	3	38	4	5.4; 2 – 11
8. Opinion	38*	24	40*	6	78	9	3.5; 1 – 9
9. Suggestion	2	1	7	1	9	1	0.8; 0 – 5
TOTAL	53	34%	72	10%	125	14%	
D. Negative socio-emotional:							
10. Disagrees	1	1	12	2	13	1	6.6; 3 – 13
11. Shows tension	0	0	0	0	0	0	4.4; 1 – 10
12. Shows antagonism	0	0	0	0	0	0	2.4; 0 – 7
TOTAL	1	1%	12	2%	13	1%	
TOTAL	157		727		884		

* $p < .01$ (X^2).

Based on Table 4, in relation to Bales' face-to-face group studies:

- The online group showed considerably less *negative socio-emotional* behaviour: all observed totals in the online group were less than Bales' suggested limits (category D, items #10 – 12), and two types of behaviour, *show tension* and *show antagonism*, were not observed in the online group at all.
- The online and face-to-face groups were similar in *task-asking* processes: all of the observed totals were within Bales' limits (category B, items #7 – 9).

- The online group's behaviour was within Bales' limits on 2 of the 3 behaviours in the *task-giving* (category B, items #4 – 6): the occurrence of *giving opinion* was at the high end of Bales' estimate; the value for *giving suggestion* was just below the lowest limit.
- *Positive socio-emotional* processes (category A, #1 – 3) varied in occurrence: *solidarity* was at the high end of the Bales' estimate, *tension-release* (because there was no tension generated) was below the estimate, and *agrees* was comfortably in the middle of Bales' suggested limit.

In regard to *processes* engaged in by specific participants:

- The instructor engaged in **less**:
 - *agree* (5%) – half the students' level (10%), and less than Bales' limits (6 – 20%);
 - *giving opinion* (27%) – less than the students (54%), but within Bales' estimates (21 – 40%).
- The instructor engaged in **more**:
 - *ask for opinion* (24%) – over four times the students' level (6%), and well over Bales' estimate (1 – 9%).
 - *giving suggestion* (4%) – over the students' (1%), but within Bales' estimate (2 – 11%).
- The students' higher level of *gives opinion* (43%) was outside of Bales' estimate (21 – 40%).
- The online group as a whole (students and instructor) differed from the face-to-face group in engaging in less *tension release* (#2) and *giving suggestions* (#4). (The former was because the online group engaged in no *show tension* (#11) and *antagonism* (#12), and in considerably less *disagrees* (#10), than Bales observed in face-to-face groups.)

As shown in Table 5, below, there was one gender-related difference: female students differed from males, and from the instructor, in relation to information: women more often engaged in interactions giving information, and less often engaged in communications seeking it.

Table 5. Gender differences in interaction type

Type	Instructor		Students				Total	
			Males		Females			
	#	%	#	%	#	%	#	%
6. Give information	40	25%	66	25%	144	31%	210	29%
7. Ask for information	13	8	15	6	10	2	25	3

Problem resolution. As shown previously in Table 1, resolution of "problems" of group management are described in pairings of Bales' categories. Based on Table 4, above, the following observations can be made about communications problems in this online group, versus those found in Bales' face-to-face environment.

- *Problems of integration and tension management* (pairs #1 & 12, and 2 & 11) were rare to nonexistent online, while expressions of solidarity were similar to levels Bales reported findings in his face-to-face groups. (The lack of tension explains the rarity of *tension-release* behaviours.)
- *Problems of decision.* Disagreement was much rarer online than in face-to-face situations, while agreement approximated face-to-face levels, especially as expressed by the students. (This finding is consistent with other reports in confirming the relatively high levels of civility in online, moderated, course-related interaction [Fahy, 2002a, 2002b], especially as compared with unmoderated listservs [Walther, 1996].)
- *Problems of control.* Perhaps not unexpectedly in the context of a graduate course, the instructor engaged in more *giving suggestions* than did the students. The students' levels of suggestion-giving were lower than observed or projected in face-to-face contexts by Bales, while the instructor's were within the predicted limits. Asking for suggestions was a relatively rare event; the instructor and the students did so about equally frequently, both occurring within levels observed and suggested by Bales.
- *Problems of evaluation.* The behaviour of the students and the instructor differed here: the instructor was much more likely to ask for opinions, but much less likely to give them, than the students. At 24% of his postings, the instructor was well above the upper limit of Bales' projection (9%) for asking opinions. The students' 43% of postings containing expressions of opinion was slightly above Bales' expected upper limit (40%).
- *Problems of orientation.* Both the instructor and the students were within Bales' limits for asking for orientation, but both totals were higher than those observed by Bales in his face-to-face groups.

The above shows the online group grappling most often with problems of orientation and evaluation, and avoiding completely problems related to tension-management. The instructor likely influenced this process heavily by regularly (and more than is typical of face-to-face interaction) asking for opinions (in a quarter of his postings), or by giving opinions (27%) or information (25%) – elements of his tutorial role. Students responded, providing opinions (43%) or information (29%).

Discussion

Bales' PA model describes "group process, and derivatively ... factors influencing that process" (Bales, 1950, p. 258). Based on the data presented above, what can be said about online communication processes?

An obvious observation is that the online group processes observed here reflected high levels of presence and control by the instructor: he led the discussion by regularly eliciting opinions from the students (one-quarter of his postings asked for opinions), and by providing "content" in the form of his own opinions and information (52% of the instructor's postings gave facts or opinion). The students clearly followed his lead: in response to the instructor's requests, 72% of the students' postings gave either an opinion or information. Clearly, the students engaged with the environment of critical inquiry provided by the instructor.

The group also maintained high levels of harmony. The online group demonstrated markedly less disagreement than Bales had encountered, or than has been observed in some online interactions. CMC may sometimes be quite fractious, especially when moderation is inadequate or missing: Walther (1996) notes that recreational conferences sometimes exhibit "all the social control of a Mardi Gras" (p. 29), and instances of flaming, bullying, and general rudeness, thought to be the result of negative disinhibition (there are also positive forms) in online environments, occur (Dede, 1996; Rupley, 2003; Schmidt, 2005). In this instance, the clear presence and regular involvement of the instructor may have influenced the interaction, though negative disinhibition is apparently not common in highly structured and moderated academic interactions (Fahy, 2002b; Fahy, 2004b).

Overall, then, interaction was characterized here by the instructor asking questions, providing some information and opinions, and the students delivering what he asked of them, all in an atmosphere of unbroken civility. In Bales' initial work, the main problems addressed by his face-to-face groups were, as here, those of *evaluation* (Table 4, Types 5 and 8; 33.5% of Bales' interactions, 49% of the online group's) and *orientation* (Types 6 and 7; 26.6%, 32% here). *Evaluation* in this sense involves "deciding what attitudes should be taken toward the situation" (Bales, 1950, p. 260), while *orientation* is "deciding what the situation is like" (p. 259). Whether these operations are at all taxonomic (as in Bloom et al.'s [1956] famous formulation, where *knowledge* precedes *evaluation*), this study cannot comment (though it acknowledges the importance of the question).

The quality of the online work environment appeared high. The group spent most of its time (84%) on task-related problems (Table 4, Categories B and C, Types 4 to 9), considerably less (15%) on supportive socio-emotional activities (Category A), and almost none on negative socio-emotional problems (Category D). From these indicators it seems the group established an environment within which members interacted smoothly (though, as had been pointed out by others, harmony online does not guarantee learning; Garrison, et al., 2000). Nevertheless, it is important that the group did not appear to waste time in excessive negative (or positive) interpersonal interaction (Walther, 1996).

Another useful metric of relative group productivity arising from the IPA analysis is a description of the communication processes in the online group, especially in relation to Bales' limits. On 7 of the twelve communications processes, the online group's behaviour was within Bales' limits, while on the remaining 5 the group was below the limits. Only in the negative socio-emotional category was the group well below, however, suggesting that, except for this factor, the online group functioned much like the face-to-face small groups Bales studied.

The difference in group behaviour may lie in the presence of the instructor. His (by example) guidance, direction, and structure undoubtedly affected the group's approach to interaction. Bales' small group, in contrast, developed leaders as they addressed their tasks. While group leadership emerged in such groups, the need to find and recognize a leader took time and energy away from task achievement, something the online group did not have to undertake. The hypothesis about the influence of leadership on interaction patterns is tentative pending further investigation, but it is consistent with preliminary findings on interactions between high- and low-engaged members in online small-groups (Fahy, 2004a).

Conclusion

The study's results may assist those involved in analyzing the nature and quality of online interaction. An established and tested tool with a research history, such as the IPA, adds the benefit of standards against which observed behaviour can be judged. Further, the IPA proved in this study that it is capable of cataloguing the activities and behaviours typical in online learning (all postings were successfully classified using the model), and of explaining important aspects of online group communications.

The results of this inquiry showed that the online communications of this group roughly resembled the face-to-face group, but also differed subtly from the face-to-face groups studied by Bales. The lack of negative interpersonal interaction was real, but may have been the result of the instructor's presence, as could the large numbers of student opinions (they gave the instructor what he asked for). Whether these are typical participant reactions and behaviours cannot be determined from this study, but use of the same tool and processes to address these questions appears to be warranted by these results. Similarly, the IPA appears capable of identifying intriguing instructor-moderator behaviour worthy of further examination (whether, for example, the pattern of diminished "giving" and frequent "asking," observed here, is typical of moderators, or, where the pattern is different, how the group is affected).

The key question left for further study is the relation of interaction patterns and behaviours to major educational objectives such as learning, student satisfaction, and the development of a supportive sense of community among the participants. These outcomes are theoretically related to interaction, as noted early in the paper; whether they can be shown to be a consequence of specific communications processes or practices now needs to be determined.

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