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Profiling individual discussants' behaviours in online asynchronous discussions

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Abstract

Abstract: This paper provides an illustrative example of an approach to creating and reporting individual profiles of engagement in particular behaviours in an online asynchronous discussion (OAD). Individual results of analysis of transcripts of an OAD can provide insights different from those gained by focusing on aggregate measures of group behaviours. In this case, we focused on individual behaviours associated with Problem Formulation and Resolution (PFR) in a one-month long OAD with seven graduate students. The transcripts of each participant were analysed for patterns of PFR behaviours using a previously designed instrument. Individual profiles of the seven participants were created. The paper provides examples of how the approach facilitated identification and comparison of individual weaknesses and strengths. Also provided are examples of how individual profiles might be useful in professional development and instructional contexts for formative or summative assessment purposes.

Résumé: L'article présente un exemple illustré d'une méthode consistant à créer et à déclarer des profils d'engagement individuels envers des comportements particuliers dans le cadre d'une discussion électronique asynchrone (DEA). Chaque résultat des analyses de transcription d'une DEA peut donner lieu à un aperçu différent de celui obtenu en se concentrant sur

des mesures globales de comportements en groupe. Dans le présent cas, nous nous concentrons sur les comportements individuels associés à la formulation et à la résolution de problèmes (FRP) dans le cadre d'une DEA qui s'est étendue sur une période d'un mois à laquelle participaient sept diplômés. Nous avons analysé les transcriptions de chaque participant en cherchant des tendances de comportements de FRP au moyen d'un instrument identifié au préalable. Des profils individuels de chacun des sept participants ont été créés. L'article illustre comment la méthode facilite l'identification et la comparaison de chacune des forces et des faiblesses. Il présente aussi comment chacun des profils peut s'avérer utile dans le cadre du perfectionnement professionnel ainsi que des contextes d'instruction aux fins de l'évaluation formative ou sommative.

Introduction

Content analysis of online asynchronous discussions (OADs) first received attention in the pivotal work of Henri (1992) who proposed a seminal model for the analysis of dimensions of the learning process. Since then, researchers have continued to use models and instruments that define processes or indicators of the particular construct under study to identify instances of particular behaviours in the transcripts of OADs. Some studies have analysed the construct of critical thinking (e.g., Newman, Johnson, Cochrane & Webb, 1996). Gunawardena, Lowe and Anderson (1997) and Kanuka and Anderson (1998) used an interaction analysis model to analyse knowledge construction. Hara, Bonk and Angeli (2000) used Henri's model to conduct content analysis of a discussion for five dimensions of the learning process. Garrison, Anderson and Archer (2000) developed a Community of Inquiry model with three components, cognitive presence, social presence, and teaching presence in order to provide a conceptual framework and tool for analysis of use of computer-mediated communication in educational contexts. Subsequently, Rourke, Anderson, Garrison and Archer (2001a) used this same tool to analyse and compare two transcripts for social presence.

Results of analyses of transcripts of discussions are often presented as aggregate or group measures. This approach to reporting may be appropriate to assess whether the group as a whole did or did not engage in behaviours related to a particular construct (e.g., knowledge construction, critical thinking, etc.). These aggregate results can then be used to improve the design and effectiveness of the overall discussion. In other cases, the approach may be used to refine analysis techniques, to test models or to identify the groups' levels of engagement in a particular construct. As an illustration of the latter Gunawardena et al. (1997) analysed an online debate to determine if the group of 554 discussants in 35 countries engaged in knowledge construction. The authors note "the objective was to evaluate the learning process taking place among the group of participants rather than to assess individual student performance" (p. 405). The approach to reporting aggregate results may also help assess whether the discussion successfully engaged participants in the targeted behaviours. For example, when Gunawardena et al.

applied their model to the analysis of the discussion they found that participants engaged primarily in just one phase of knowledge construction. The approach of presenting aggregate results can also be used to compare and contrast different discussion groups or different groups of students in the same discussion. For example, Newman et al. (1996) compared critical thinking in face-to-face seminars with computer conference discussions. Kim and Bonk (2002) used Curtis and Lawson's (2001) model to assess collaboration by cross-cultural groups of students in an online discussion.

Content analysis of OADs using models and instruments can also support identification and means of engagement in targeted behaviours by individuals and not only groups. Different insights may be gained from using one approach or the other. For example, analysis at the individual level can provide insight into a discussant's weaknesses or strengths and help identify areas needing attention. Individual results may also be useful in contexts of professional development where the focus is on developing skills related to constructs such as collaboration or problem-solving. At the same time, the approach could be useful for assessment and evaluation purposes.

There are some examples in the literature of this approach to creating and reporting individual as opposed to aggregate results of analysis of behaviours in OADs. Bullen (1997) reported individual measures of participation and critical thinking in an online discussion conducted in a university course. Using these measures together with information from individual participants such as age, gender, motivation, and educational level, Bullen found "apparent relationships between participation levels, critical thinking levels and student characteristics" (p. 151). In de Laat and Lally's (2003) study, results of computer-assisted analysis of collaborative learning and tutoring processes in an OAD among professionals were presented both for the group and for individuals. Individual results helped identify learning patterns and a variety of individual roles in tutoring. Perkins and Murphy (2006) analysed the transcripts of an OAD using a critical thinking model and presented results with a focus on individual engagement in critical thinking behaviours. This approach served to highlight similarities and differences between participants, revealing substantial differences in the proportions of engagement in critical thinking processes among different students.

While these examples show evidence of interest in reporting individual results, the more common tendency is to report aggregate results. For this reason, there are fewer cases where content analysis of OADs has focused on compiling results of individual engagement in targeted behaviours. The purpose of this paper, therefore, is to offer an illustrative example of an approach to reporting individual profiles of engagement in an OAD. In this example, we focused on a month-long discussion with a group of seven graduate students engaged in a discussion designed to promote Problem Formulation and Resolution (PFR).

The paper begins with a description of the method used for analysing the discussion transcripts using a model for identifying and measuring PFR in an OAD. The individual profiles of engagement in PFR are presented in the following section. A summary of the

profiles is then presented in table format for purposes of comparisons between individuals. The discussion section focuses on illustrating the types of insights that might be gleaned from this approach to profiling individual behaviours.

Methods

Participants were seven graduate students enrolled in a Counselling Psychology course in the fall of 2004 who volunteered to complete a one-month long online discussion designed for engagement in Problem Formulation and Resolution (PFR). The problem or issue presented for discussion was that of promoting parental involvement in schools. The unmoderated discussion consisted of eight discussion prompts or tasks such as the following: "*You have had the opportunity to read one research article on the problem. Compose and post a message in which you describe how your understanding of the problem has changed as a result of having read the article*" (Murphy, 2004b). The first five tasks were designed to support engagement in Problem Formulation while the remaining three tasks were designed to support Problem Resolution. Therefore there was greater emphasis on Formulation (63% of tasks) than on Resolution (37% of tasks). In other words, the discussion was designed to engage participants in formulating and understanding the problem before attempting to solve it.

Once all eight tasks were completed, participants' transcripts were compiled, printed, and then coded for PFR behaviours using the instrument outlined in Table 1. This was a second iteration of the instrument designed for identification and measurement of PFR (see Murphy, 2004a). The instrument is divided into two main categories: Problem Formulation and Problem Resolution. Two processes are associated with Problem Formulation: *Defining the problem space* and *Building knowledge*. Three are associated with Problem Resolution: *Identifying solutions*; *Evaluating solutions*; and *Acting on solutions*. Finally, there are a total of 19 indicators associated with these five processes. Table 1 presents the instrument with the codes used for analysing the transcripts.

Table 1. *Instrument for Identifying and Measuring Problem Formulation and Resolution in an Online Asynchronous Discussion (Murphy, 2004a)*

Process	Indicator	Codes
FORMULATION		
Defining problem space	• Agreeing with problem as presented in OAD	FDA
	• Specifying ways in which problem may manifest itself	FDS
	• Redefining problem within problem space	FDR
	• Minimizing and/or denying the problem	FDM
	• Identifying extent of problem	FDIe
	• Identifying causes of problem	FDIc
	• Articulating problem outside problem space	FDAp
Building knowledge	• Identifying unknowns in knowledge	FBI
	• Accessing and reporting on sources of information	FBA
	• Identifying value of information	FBIv
	• Reflecting on one's thinking	FBR
RESOLUTION		
Identifying solutions	• Proposing solutions	RIP
	• Hypothesizing about solutions	RIH
Evaluating solutions	• Agreeing with solutions proposed by others	REA
	• Weighing and comparing alternative solutions	REW
	• Critiquing solutions	REC
	• Rejecting/eliminating solutions judged unworkable	RER
Acting on solutions	• Planning to act	RAP
	• Reaching conclusions, or arriving at an understanding of problem	RAR

The unit of analysis chosen for coding was the paragraph. A total of 260 paragraphs were coded. Unlike the thematic unit or unit of meaning, syntactic units such as the paragraph have the advantage of being objectively identified and constant within a transcript (Fahy, 2001; Rourke, Anderson, Garrison, & Archer, 2001b). The transcripts were first coded simultaneously by two separate coders (coder A and coder B). Inter-rater reliability was calculated using Cohen's Kappa. The value was 0.591. A subsequent second stage of coding was conducted by the two coders in conjunction with the principal investigator (coder C) and creator of the instrument. All discrepancies were discussed until 100% agreement was reached among the three coders, resulting in a consensual coding (A+B+C). It is the results of this second stage of coding that were used to create the profiles presented in this paper.

Individual profiles

This section presents the individual profiles of engagement in PFR based on analysis of the transcripts using the instrument. Pseudonyms are used for participants. For each individual, a figure first summarises the percentages of units coded for the behaviours associated with the various indicators for Problem Formulation and Resolution. The figure is followed by the descriptive profiles of the individual, presented in two parts, first for

Problem Formulation and, second, for Problem Resolution.

Profile of Laura

In spite of the fact that the discussion was designed to engage participants in as much Formulation as Resolution, Laura's engagement in Formulation counted for only 36% of all units coded for in her transcript. 12% of the units coded for Formulation involved identifying causes while another 12% involved reflecting on her thinking. Finally, 3% of units accounted for each of four other indicators: agreeing with the problem as presented; specifying ways the problem manifests itself; accessing and reporting on sources of information; and identifying the value of knowledge. Of the 11 indicators associated with Formulation in the coding instrument, only six of these were actually coded for in her transcript. In this regard, Laura did not redefine, minimise, or identify the extent of the problem, nor did she articulate a problem outside the problem space or identify unknowns in knowledge.

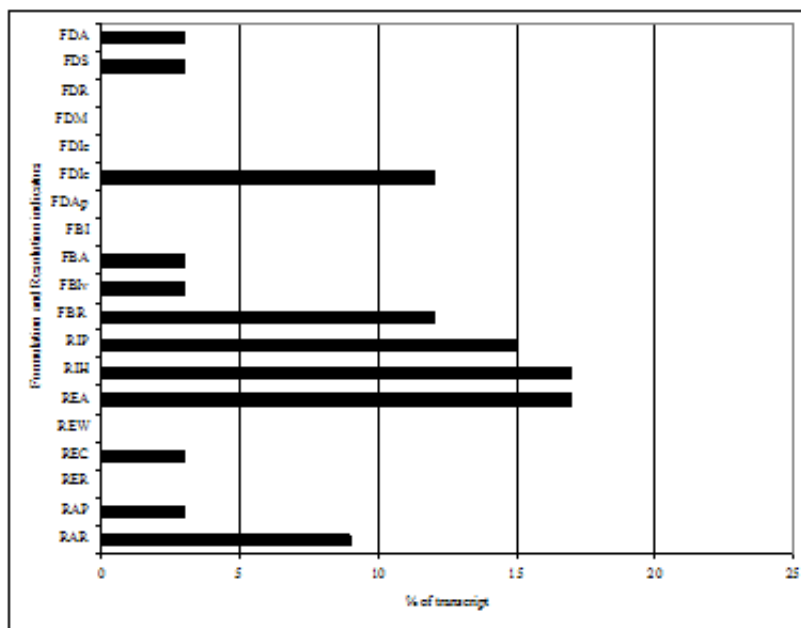


Figure 1. Summary of Laura's engagement in Formulation and Resolution.

Resolution

Compared with other participants, Laura exhibited the highest percentages for engagement in Resolution (64% of units in her transcript). Only three of the total eight indicators for Resolution were privileged. Seventeen percent of the units were coded as hypothesising about solutions. Another 17% were coded as agreeing with solutions proposed by others, and 15% were coded as proposing solutions. Reaching conclusions or arriving at an understanding of the problem involved 9% of coded units in Laura's transcript, which was the highest percentage for this behaviour as compared with other participants. Three percent of units each were coded for critiquing solutions and planning to act. Laura did not weigh and compare solutions or reject solutions judged unworkable. Laura's overemphasis on solutions is highlighted by the fact that her very first posting in the discussion was

coded as hypothesising about solutions, even if she had not yet formulated the problem. While four of the seven participants did not hypothesise about solutions, Laura devoted 17% of units to this behaviour. Laura was the only participant who did not only emphasise proposing solutions but also privileged hypothesising about solutions when engaging in Resolution.

Profile of Thomas

The percentage of units coded in Thomas' transcript for engagement in each of the categories of Formulation and Resolution was 50%. Within Formulation, Frank engaged in eight of the 11 possible types of behaviours. In terms of the units coded in his transcript for those behaviours, accessing and reporting on sources of information was the behaviour coded for most frequently (14% of units). Compared with other participants, Thomas' transcript together with Frank's exhibited the highest percentages for agreement with the problem as presented (6%). However, Thomas did not redefine or minimise the problem nor did he identify unknowns in knowledge.

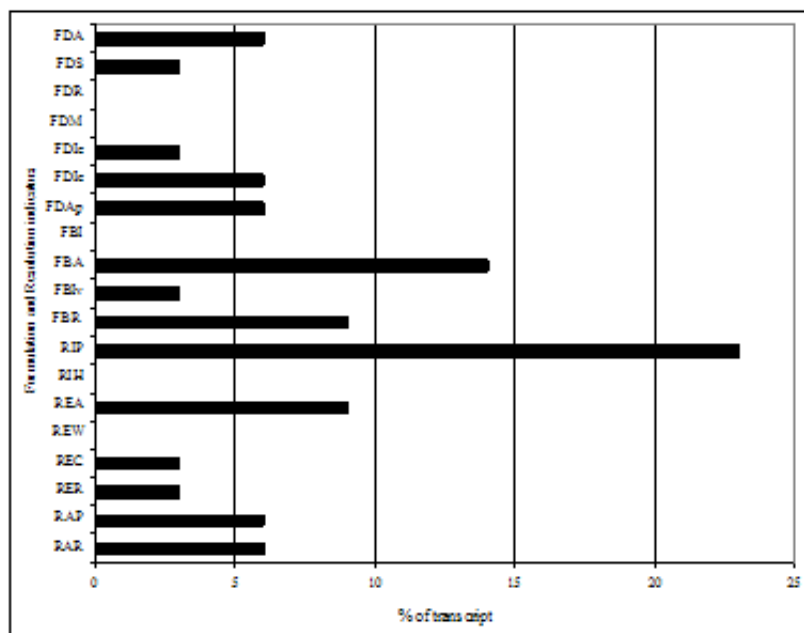


Figure 2. Summary of Thomas' engagement in Formulation and Resolution.

Resolution

Twenty-three percent of units in Thomas' transcript corresponded to proposing solutions, which is the behaviour he favoured over the other four Resolution behaviours coded for in his transcript. The other behaviour he favoured within Resolution was agreeing with solutions proposed by others (9% of units). He also engaged in planning to act and reaching conclusions (6% each), and in critiquing solutions and rejecting solutions judged unworkable (3% each). Of interest is the fact that Thomas' transcript exhibited the highest percentage among all participants for engagement in planning to act. Also of note is the fact that only Thomas' transcript reflected engagement in rejecting solutions judged unworkable. Thomas did not engage in hypothesising about solutions, nor did he weigh and

compare alternative solutions.

Profile of Andrea

In marked contrast with the other participants, Andrea's engagement in Formulation was almost double her engagement in Resolution. For example, 65% and 35% of the units in Andrea's transcript accounted for Formulation and Resolution respectively, whereas in Laura's transcript, the percentages were almost the reverse. Andrea engaged in nine of the 11 Formulation behaviours identified in the instrument. Her focus on Formulation is illustrated by the fact that her engagement in one particular behaviour within Formulation, identifying the value of knowledge, accounted for 22% of her units. This percentage was double that of other participants' engagement. She also favoured accessing and reporting on sources of information (13% of units). Andrea tended to engage in articulating a problem outside the problem space or digressing, for example talking about her work situation. Nine percent of her units were coded as articulating a problem outside the problem space, which was the highest percentage for this behaviour among all participants. Of interest is the fact that only two participants, Andrea and Susan, engaged in minimising the problem. Andrea also engaged in agreeing with the problem as presented, specifying ways the problem manifests itself, redefining the problem, identifying its causes, and reflecting on her thinking. She did not engage in identifying the extent of the problem or in identifying unknowns in knowledge.

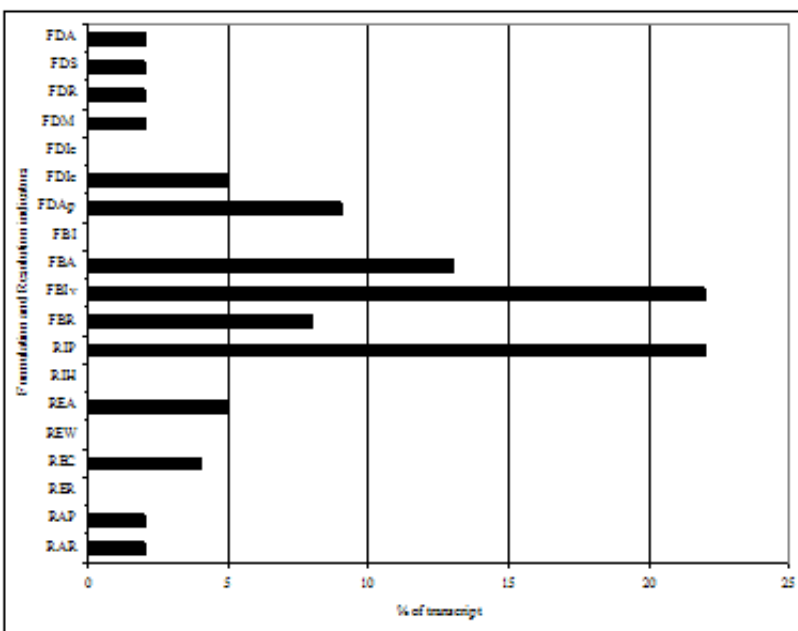


Figure 3. Summary of Andrea's engagement in Formulation and Resolution.

Resolution

Like Thomas, Andrea did not engage frequently in Resolution until half-way through the discussion. Within Resolution, she privileged proposing solutions. In fact, she engaged more in proposing solutions than in any other behaviour related to Formulation or Resolution. Proposing solutions accounted for 22% of units in her transcript. In contrast, percentages were low for the other four Resolution behaviours Andrea engaged in, each of

which accounted for 5% or less of units coded. Andrea's focus on proposing solutions above any other Resolution behaviour is illustrated by the fact that the percentage of units coded in her transcript for agreeing with solutions proposed by others (5%) was the lowest as compared with the other participants. The other behaviours related to Resolution that Andrea engaged in were critiquing solutions, planning to act, and arriving at a conclusion. She did not engage in hypothesising about solutions, weighing solutions, or rejecting solutions judged unworkable.

Profile of Carol

Carol concentrated both on Formulation and on Resolution (47% and 53% of her units respectively). Compared with other participants, within Formulation, Carol exhibited the highest percentage of units coded as specifying ways the problem manifests itself (6% of units). Carol privileged accessing and reporting on sources of information and identifying the value of information (13% of units each). In her transcript, only one unit was coded as identifying causes of the problem, which accounted for 3% of her units. Of interest within Formulation is the fact that only Carol, Susan and Andrea engaged in redefining the problem within the problem space. Within Formulation, Carol also agreed with the problem as presented, and reflected on her thinking. However, she did not minimise the problem, identify the extent of the problem, articulate a problem outside the problem space, or identify unknowns in knowledge.

Resolution

Within Resolution, Carol concentrated on proposing solutions and on agreeing with solutions. Carol's and Erin's transcripts presented the highest percentages of units coded as proposing solutions (25%). She also concentrated on hypothesising about solutions, critiquing solutions, and reaching conclusions. Her engagement in hypothesising about solutions accounted for 6% of units in her transcript. Of interest is the fact that this represented the second highest percentage in the discussion for that behaviour, whereas four other participants did not engage in hypothesising about solutions. Carol did not engage in other behaviours associated with Resolution, such as weighing and comparing solutions, rejecting solutions judged unworkable, or planning to act.

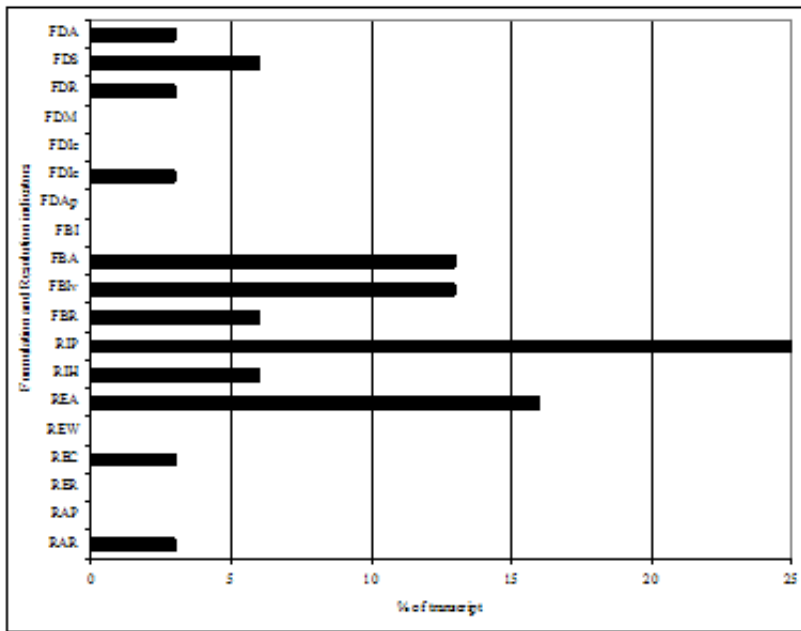


Figure 4. Summary of Carol's engagement in Formulation and Resolution.

Profile of Frank

Fifty-four percent and 46% of the units in Frank's transcript were coded for Formulation and Resolution behaviours respectively. Frank's and Thomas' engagement in accessing and reporting on sources of information accounted for 14% of their transcripts, which was the highest percentage coded for this behaviour among all participants. This is precisely the Formulation behaviour Frank engaged in most, followed by identifying the value of information (10% of units). He identified causes of the problem (9%), reflected on his thinking (9%), and agreed with the problem as presented (6%). Finally, he also specified ways the problem manifests itself and identified the extent of the problem (3% of units each). Frank did not engage in redefining the problem within the problem space, minimising the problem, articulating a problem outside the problem space, or identifying unknowns in knowledge.

Resolution

Like Laura, Frank engaged in Resolution from early on in the discussion. Within Resolution, most units coded in Frank's transcript corresponded to proposing solutions and agreeing with solutions proposed by others (17% and 23% respectively). His engagement in agreeing with solutions proposed by others was the highest among all participants. Whereas Frank concentrated on proposing solutions and agreeing with solutions, he only minimally hypothesised about solutions and critiqued solutions. Like most other participants, Frank did not weigh and compare alternative solutions or reject solutions. With regard to Resolution, it is also of note that Frank was the only participant who did not engage in reaching conclusions. Like other three participants (Carol, Susan, and Erin), he did not engage in planning to act.

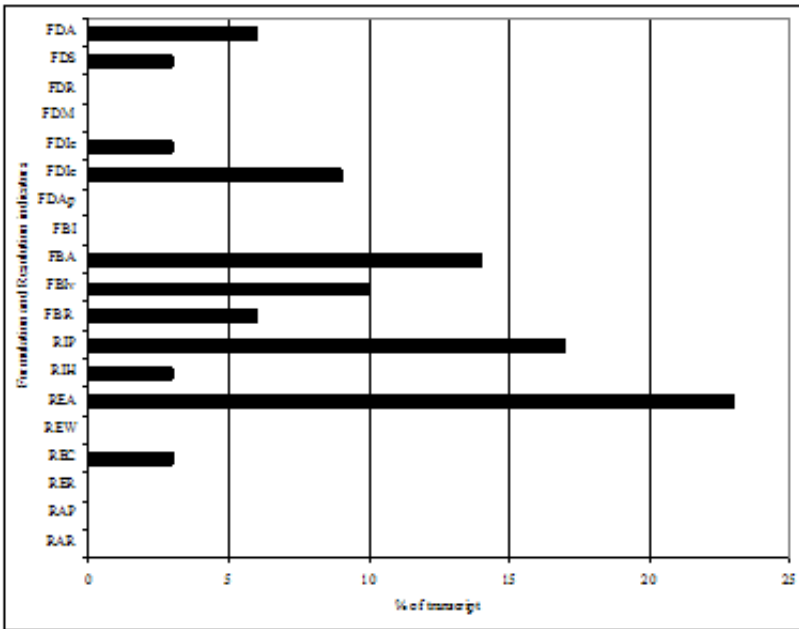


Figure 5. Summary of Frank’s engagement in Formulation and Resolution.

Profile of Susan

Fifty-six percent of units coded in Susan’s transcript related to Formulation behaviours. Susan engaged in eight of the 11 Formulation behaviours identified in the instrument. Compared with other participants, Susan exhibited the highest percentage of units coded as identifying the extent of the problem (9%), minimising the problem (6%), and redefining the problem (4%). Within Formulation, only one other participant engaged in minimising the problem and only two others in redefining the problem. She also identified causes of the problem, articulated a problem outside the problem space, accessed and reported on sources of information, identified the value of information, and reflected on her thinking. However, Susan and Erin were the only participants who did not agree with the problem or specify ways the problem manifests itself.

Resolution

Within Resolution, Susan privileged two behaviours, proposing solutions and agreeing with solutions proposed by others. Nineteen percent of units in her transcript were coded for each of these behaviours. Compared with the other participants, Susan’s transcript exhibited the second highest percentage of units coded as agreeing with solutions proposed by others. She also engaged in critiquing solutions (3%) and reaching conclusions (3%). However, she did not engage in hypothesising about solutions, like Thomas, Andrea, and Erin, and she did not weigh and compare alternative solutions, reject solutions, or plan to act.

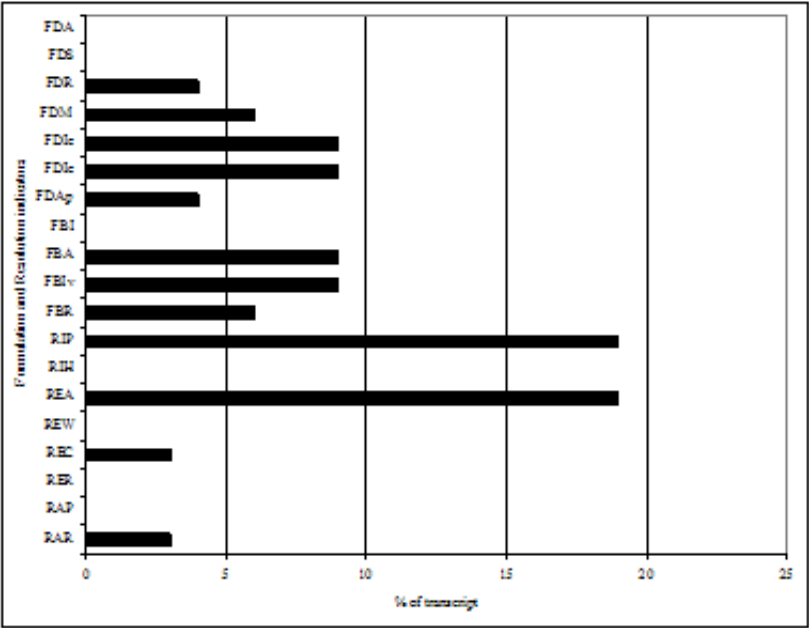


Figure 6. Summary of Susan’s engagement in Formulation and Resolution.

Profile of Erin

Erin concentrated both on Formulation and on Resolution (53% and 47% of units coded respectively). She engaged in five of the 10 Formulation behaviours present in the instrument. Erin’s transcript presented the highest percentage of units coded for identifying causes of the problem (20%). She also focused on accessing and reporting on sources of information, identifying the value of information, articulating a problem outside the problem space, and reflecting on her thinking. Compared with other participants, her engagement in reflecting on her thinking exhibited the lowest percentage of units coded (5%). Erin and Susan were the only participants who did not engage in agreeing with the problem as presented and in specifying ways the problem manifests itself. Erin neither engaged in redefining the problem, minimising it, indicating its extent, nor recognising unknowns in knowledge.

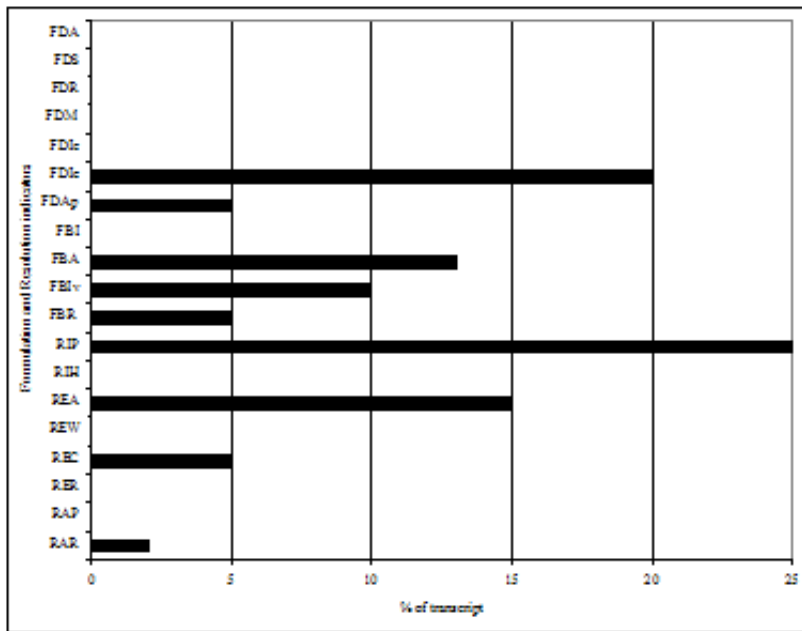


Figure 7. Summary of Erin's engagement in Formulation and Resolution.

Formulation

Erin engaged in four of the eight Resolution behaviours identified in the instrument. She focused primarily on proposing solutions and agreeing with solutions. Twenty-five percent of the units in Erin's transcript were coded as proposing solutions. Together with Carol, Erin exhibited the highest percentage for engagement in this behaviour compared with other participants. In comparison with the other participants' transcripts, Erin's transcript also exhibited the highest percentage of units coded as critiquing or questioning solutions (5%). She also engaged in reaching conclusions (2% of units). Like other participants, she did not engage in hypothesising about solutions, weighing and comparing solutions, rejecting solutions judged unworkable, or planning to act.

Summary of profiles

To support comparison among participants, Table 2 presents individual summaries of their engagement in Problem Formulation and Resolution. Results are provided for each participant in terms of the percentage of units coded in relation to their transcript as a whole. For each participant, the percentage of units coded for the 11 indicators of Problem Formulation and the eight indicators of Problem Resolution in the instrument are presented. Total percentages for engagement in the categories of Formulation and Resolution are also provided. For a full description of the indicators, see Table 1.

Table 2. *Summaries of Participants' Engagement in Problem Formulation and Problem Resolution by Indicator and by Category*

		Laura	Thomas	Andrea	Carol	Frank	Susan	Erin
Formulation	FDA	3	6	2	3	6	0	0
	FDS	3	3	2	6	3	0	0
	FDR	0	0	2	3	0	4	0
	FDM	0	0	2	0	0	6	0
	FDIe	0	3	0	0	3	9	0
	FDIc	12	6	5	3	9	9	20
	FDAp	0	6	9	0	0	4	5
	FBI	0	0	0	0	0	0	0
	FBA	3	14	13	13	14	9	13
	FBIv	3	3	22	13	10	9	10
	FBR	12	8	8	6	9	6	5
Total %		36	50	65	47	54	56	53
		Laura	Thomas	Andrea	Carol	Frank	Susan	Erin
Resolution	RIP	15	23	22	25	17	19	25
	RIH	17	0	0	6	3	0	0
	REA	17	9	5	16	23	19	15
	REW	0	0	0	0	0	0	0
	REC	3	3	4	3	3	3	5
	RER	0	3	0	0	0	0	0
	RAP	3	6	2	0	0	0	0
	RAR	9	6	2	3	0	3	2
Total %		64	50	35	53	46	44	47

Discussion

This paper provides an illustrative example of an approach to creating and reporting individual profiles of engagement in particular behaviours in an OAD. In this case, we focused on individual behaviours associated with Problem Formulation and Resolution (PFR) in a one-month long OAD with seven graduate students. The individual profiles represent examples of how this approach can facilitate the identification of differences in individual participants' patterns of engagement in Problem Formulation and Problem Resolution. The approach can also facilitate comparison and contrasting of those patterns. For example, in terms of individual participants' engagement in Formulation and Resolution

in the discussion, Andrea favoured Formulation (65% of units in her transcript); in contrast, Laura favoured engagement in behaviours related to Resolution (64% of units); while the other five participants engaged almost equally in both (see Table 2). These types of results can help identify weaknesses and strengths in participants' abilities to engage in Problem Formulation and Resolution. The results could be used for assessment purposes or for guiding participants in a context of learning.

The individual profiles could also be useful in relation to the design and goals of the discussion. In our case, the discussion was designed to place greater emphasis on Formulation (63% of tasks) than on Resolution (37% of tasks). Andrea's results of engagement in Formulation and Resolution behaviours, with 65% and 35% of units coded respectively, matched almost exactly the distribution of tasks in the discussion. As the only individual who clearly favoured Formulation over Resolution, she presents an example of a model of engagement in PFR. The results of analysis of her transcript illustrate how the approach might be useful in terms of identifying best practices. These best practices could subsequently be used to provide instructors and students with models of engagement in the behaviours for which the discussion was designed.

In contrast to Andrea, Laura favoured Resolution. Laura's engagement, with 36% and 64% of her units corresponding to Formulation and Resolution respectively, was almost exactly the opposite of Andrea's. In this case, the focus on individual participants' behaviours, therefore, highlighted a weakness in Laura's engagement in relation to the behaviours the discussion targeted. The identification of such weaknesses might be useful for formative or summative evaluation purposes in an instructional context. In addition, this type of information might be useful in a context of professional development using OADs. If analysis were performed during the discussion, it might be possible to orient participants' behaviours so that they correspond more with the required discussion tasks. Laura's preference for Resolution instead of Formulation suggests that the design of the discussion was not always effective in promoting engagement in the targeted behaviours. These types of results can reveal aspects of the design that may need to be reconceptualised to help participants such as Laura engage more in Formulation.

In relation to the indicators of Formulation and Resolution, the individual profiles illustrated how the approach can reveal the range of variation among participants' behaviours. If results for the whole group had been reported, it would not have been possible to compare participants' behaviours. In addition, aggregate results, especially when presented in terms of averages, may be misleading if there is a wide range between participants. Aggregate results may also fail to reveal the whole range of behaviours each individual engaged in. In our OAD, for some PFR behaviours, individual results revealed important differences between participants. It was possible to identify which participants engaged more or less than others in specific behaviours. For example, within Formulation, engagement in identifying the value of information ranged between 3% and 22% of units among participants. Andrea's engagement in this behaviour, with 22% of units in her transcript coded for it, surpassed the other discussants' engagement. Within Resolution,

the largest range among participants in terms of engagement in one particular behaviour corresponded to agreeing with solutions proposed by others. Only 5% of units in Andrea's transcript related to this behaviour, whereas Frank devoted 23% of units to it. In contrast with the other participants, who favoured proposing solutions within Resolution, Laura was the only one who devoted more units in her transcript to hypothesising about solutions (17%) than to proposing solutions (15%).

Finally, the focus on behaviours associated with the indicators at the individual level helped identify when individual participants only engaged in a limited number of behaviours rather than engaging in a variety of behaviours. If, for example, we considered engagement in as many PFR behaviours as a desired outcome of the discussion, then Erin would show a weakness in terms of her engagement in Formulation. Erin focused mostly on one particular behaviour, identifying causes of the problem, while she did not engage in a variety of other Formulation behaviours. Within Resolution, most participants favoured proposing solutions and agreeing with solutions proposed by others, while nobody engaged in weighing and comparing alternative solutions. For example, almost all of Andrea's engagement in Resolution corresponded to just one behaviour, proposing solutions.

Conclusion

This paper illustrated the value of an approach to creating and reporting individual profiles of discussants' behaviours in an OAD. This approach supported comparing and highlighting the particular behaviours participants tended to engage in over other behaviours. It supported identification of the behaviours individuals favoured and identification of the behaviours in which they engaged only minimally. Comparing and contrasting individual participants' engagement was useful to gain insight into their weaknesses and strengths. The approach also revealed patterns of engagement in PFR behaviours in the discussion and the range of behaviours in which participants engaged. It also indicated whether individual patterns of behaviour matched or did not match the purpose and design of the discussion which was intended to engage participants more in Formulation than in Resolution. The results could be used for various purposes, such as to assess the overall effectiveness of a discussion and subsequently redesign it, to guide and support individuals in professional development contexts, and to support formative and summative assessment of individuals.

In spite of its usefulness, the approach presents some limitations. These relate to the resources needed to compile individual profiles. If used for individual assessment, the approach would be onerous for the instructor in terms of the time needed to code transcripts and analyse results. In this case, computer-assisted analysis might be helpful. Alternatively, students might be required to self-analyse and evaluate their contributions or other students' contributions. Another limitation of the approach is that it does not provide insight into why participants did or did not engage in particular behaviours or why they engaged in some behaviours over others. In this regard, the approach could be enhanced by combining analysis of individual transcripts with further qualitative data that provide insight into individuals' thinking. Hara et al. (2000) suggested that content

analysis of online discussions should be complemented by additional tools such as interviews and retrospective analysis to gain additional insight. Some studies have used analysis of online discussion transcripts in combination with other data collection methods such as surveys, individual interviews, focus groups, or recalls (e.g., Bullen, 1997; Cheung & Hew, 2004; de Laat & Lally, 2003; Rourke & Anderson, 2002).

The study is limited in its small number of participants as well as its use of only one instrument. However, it does provide an indication of alternative approaches that can be taken in the context of content analysis of OADs. Further studies might make use of other instruments and compare their value. Researchers may also consider behaviours associated, not only with Problem Formulation and Resolution, but also with critical thinking, collaboration, knowledge construction, social presence, or any combination of these. They may also wish to analyse the transcripts of discussions in subject areas other than Counselling Psychology. Other studies might provide an opportunity to not only include graduate students, as was the case in this study, but also undergraduate students.

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