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Situational Differences in Working Together: Examples From Veterinary Anatomy, Physiology And Radiographic Interpretation Sessions

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Abstract

In the framework of quality of learning the social interactions between veterinary students were investigated. Observational data were collected during anatomy, physiology and radiology face-to-face small group sessions using Bales' interaction process analysis framework, and in a radiology context the students' observations were compared with the results of a checklist (yes or no) completed by the teacher of these students. During radiology group sessions solidarity, tension release and agreement with constructive disagreement element were showed. Observations also revealed variable level of task-oriented (asking and providing information) action depending on day and task under consideration. The students were interested in each other, even though this was not supported by teacher's checklist perhaps due to the teacher's role as a learning resource. In contrast, during anatomy and physiology group sessions variable level of emotion-oriented (positive or negative) action was found. Students were task-oriented with variable interest in each other. The quality of group work in all cases may be dependent on the number of students and their fragmentation into sub-groups, or momentary changes in group dynamics, which might influence the teacher's role as an active tutor during entire learning session.

Keywords: Interaction process analysis; Face-to-Face; Quality of learning; Social interactions; Veterinary

Introduction

Completing studies in veterinary medicine in Finland the veterinarian "has the capacity for comprehensive communication and collaboration" with other essential professional skills [1]. However, skills relating to strong interpersonal communication have often been noted as lacking in veterinary curricula in Finland and in other countries [2,3]. This is closely related to the quality of veterinary education. In radiology, for example, the diagnosis involves the integration of several distinct bodies of knowledge with separate organizing principles, including physiology, anatomy, medical theories of disease, the projective geometry of radiography [4] – and articulation of findings for peers and clients. The general novice-expert research has focused on examining the development of cognitive skills such as problem-solving [5-7], writing [8] or interpretation of x-rays [4,9], but neglects the evolutionary investigation of oral communication skills.

From the perspective of sociocultural learning theory [10] with its emphasis on collaboration and information scaffolding, group work facilitates the development of interpersonal communication and consultation skills by co-construction of knowledge. It has been reported in some interaction studies among veterinary students that all students responded positively to group learning [11-14] indicating that it is pleasant to work with peers [12]. Group learning is also considered as a useful learning facilitator among Finnish veterinary students [15], although in final evaluation sheets filled by Finnish veterinary alumni annually just after their graduating, insufficient communication skills have been repeatedly reported.

The sociocultural approach also emphasizes the teacher's or advanced peers' role in enculturating the learner into their own community. Usually, this is believed to be related to student-teacher (novice-expert) interactions. Utilization of cultural symbols unique in veterinary science (e.g. veterinary language) and the expression of (cultural) symbols of solidarity and acceptance in small group situations between students and teachers [16] may socialize the participants, increase the cohesion between individual students and ultimately enhance students' learning. However, greater cohesion could also have negative consequences such as distracting a group from concentrating on its task [17] and positive group mood could led to lower quality decisions than do negative or neutral ones [18]. It has also been shown that university students work well in a collaborative learning situation without the teacher's continuous guidance [19]. One typical form of collaborative learning without dominant teacher, also adopted in Finnish veterinary program in preclinical but not in clinical years, is problem-based learning (PBL) concept, which has clearly defined steps for students' progress. In this context a problem refers to an unsettled, puzzling, unsolved issue that needs to be resolved [20]. The problem will be resolved together, by consultations and negotiations like experts in clinic settings.

According to Horii [21] educators are not always aware of the differences in behavior between the novice and the expert. It is found in literature that there are both quantitative and qualitative differences between novices and experts [22] when individual capacity for problem-solving was inspected [23]. For example during critical events in high risk industries the experts increase their communication, specifically information exchange and verbalization of plans [24-26]. Thus, the central question in interactional study design concentrated on process

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rather than outcome would be what the participants actually do when they work together. Are they task-oriented professionals, emotion- and socially-oriented entertainers or both at same time? Are they team-players or competing individuals? It would also be interesting to know whether the interactions between veterinary students are typical of student-teacher interactions found in a previous study [16] or working without their teacher.

Description of the IPA

Bales' interaction process analysis (IPA) [27] is one of the best known frameworks, which enables the observer to categorize the social interactions (or incidents) in small group situations. This framework has been reflected in many theories about groups [28,29] and it seem like a good match to task and socioemotional behavior distinctions even in more recent study about mood in groups [17]. Bales defined twelve categories describing various types of behavior, comprising four classes called 'emotion-oriented positive reactions', 'attempted answers', 'questions' and 'emotion-oriented negative reactions' (Table 1). These traditional [27] and revised [30] categories have been employed in studies investigating group effectiveness [31]. For those interested in the distinctions between the different categories and a preliminary application of this framework for veterinary science have access to previous study [16], thus only some important examples are herein presented (Table 2).

Aims of the study

The main goal of this study was to reveal the nature of student interaction situations using Bales IPA framework in veterinary anatomy, physiology and radiology contexts. Due to the qualitative nature of this goal no testable hypotheses were established. Secondly, the study aimed to discuss findings from previous, student-teacher interaction situations [16,32] and integrate these findings to those situations where there is no teacher's continuous guidance.

Methodology

Context

Anatomy and physiology: In Finnish veterinary education first-year students participate in an integrated preclinical module including veterinary anatomy and physiology. The module is implemented by PBL concept. The students have expert lectures and independent exercises immediately after lectures. Exercises are practical rather than theoretical – as opposed to PBL in general - : in 2002 curriculum the students had to dissect the heart, listen to the dog's heart sounds, and measure blood pressure and ECG. An idea is that in exercises the students work together without their teacher. The teacher is present when needed, but not all the time.

Radiology: At the University of Helsinki's Faculty of Veterinary Medicine, practical teaching sessions in the fifth year of the veterinary medical education program are an essential part of the students' professional training. During this time, students are given the responsibility of looking after patients, under the supervision of their teachers. In a radiology clinical practical setting, in addition to teacher-led sessions, the students also have small-group, self-directed sessions in which they are required to solve radiological problems without the teacher present. This requires that the students must discuss clinical cases with each other. The task is allocated at the beginning of the study week and concludes at the end of this week with discussions between the students and their teacher.

Study Participants and Implementation of the Study

Anatomy and physiology: Data was based on first author's unpublished master's thesis concerned with interaction in integrated preclinical module [33]. This study was executed in winter 2002 by observing anatomy, physiology and two optional learning periods. A particular student was not selected for an object, and therefore, a particular student could occur in several situations in a way that could not know in advance. As a result of that study, 14 hours of observation material was achieved. Observation period of anatomy (two hours) and physiology (two hours) were included in current study because of their nature as knowledge precursors of radiological interpretation process. Acts between students and their teachers were removed, and only acts from student to student were examined. They were all acts based on Bales' categorization classified by two independent observers.

In a new analysis in this study the number and distribution of acts in anatomy and physiology group situations were statistically compared. Registered acts were collected under four main classes of Bales: positive reactions (acts from categories 1-3), attempted answers (categories 4-6), questions (categories 7-9) and negative reactions (categories 10-12). For analysis purpose χ^2- test was adopted.

Radiology: This study was conducted during February 2010, with five fifth year students on the radiology rotation. The student group was randomly selected by trusting the findings of homogeneity of behavior among Finnish veterinary students [16,32,33] and 36 years teaching experience of radiology teacher. These students have a shared study history since their first study year, typical of Finnish veterinary education in this and other courses. The student group was observed on four consecutive days (from Monday to Thursday) during periods

Category	Typical behaviors
A. Emotion-oriented: Positive reactions	1. Shows **solidarity**: raises other's status, gives help, rewards
	2. Shows **tension release**: jokes, laughs, shows satisfaction
	3. Shows **agreement**: admits, adapts
B. Task-oriented: Attempted answers (neutral), also the problems outside of patients' ones but inside of students' own life were included	4. Gives **suggestion**, advice
	5. Gives **opinion**, attitudes, judgments and emotions, wishes
	6. Gives **orientation**, advice, reports, repeats, clarifies
C. Task-oriented: Questions (neutral), also the problems outside of patients' ones but inside of students' own life were included	7. Asks for **orientation**, information, repetition, confirmation
	8. Asks for **opinion**, information, repetition, judgment and emotion
	9. Asks for **suggestion**, advice
D. Emotion-oriented: Negative reactions	10. Shows **disagreement**: shows passive rejection, formality, withholds help
	11. Shows **tension**: asks help, withdraws
	12. Shows **antagonism**: shows aggression, ridicules, defends

Table 1: Interaction Process Analysis (adapted from Bales (1951)).

1. Seem friendly	|			
2. Dramatizes	|			
3. Agrees				”Yes”, “OK”
4. Gives suggestion				“I think you should…”
5. Gives opinion				“I think it is...”
6. Gives information				“This is…” “This means…”
7. Asks for information				”Is this…?” “Have you heard?”
8. Asks for opinion				“What do you think, is this full of gas?”
9. Asks for suggestion				”What shall we do?”
10. Disagrees				”No.”
11. Shows tension				
12. Seems unfriendly				

Table 2: Evaluation sheet for observation purposes.

Give an answer (yes or no)
1. The students help each other in this group
2. The students show signs of satisfaction and freedom in this group
3. The students agree and adapt in this group
4. The students give constructive suggestions and advice each other in this group
5. The students express their opinions, feelings, emotions and wishes in this group
6. The students give advice and reports, repeats and clarify in this group
7. The students ask for guidance and information, repetition and confirmation in this group
8. The students ask for each other's opinions and emotions in this group
9. The students ask for suggestions and advice from each other in this group
10. The students show disagreement, passive rejection or formality in this group
11. The students show tension (ask help, withdraw) in this group
12. The students show aggression and they have a need to defend in this group

Table 3: The checklist for teacher

lasting 25 to 30 minutes. The interactions in self-directed sessions were observed by the first author according to Bales' categories, while the teacher of these students was asked to complete a checklist, based on Bales' categories (Table 3), and the results were qualitatively compared with those from the observations.

On Day 1, all five students participated. During other days the number of students varied depending on clinical commitments to patients. On Day 2, two to four students were present during observation period. Respectively, three to four students were available on Days 3 and 4.

After the cooperation agreement negotiated with each student the Bales' categories were prepared and drawn in the paper (Table 2). Practically, when the suitable reaction criteria fulfilled, it was immediately scored | like in (Table 2), and the response, first part of it, or description of this response (laughing, goes next in order to help) was recorded in written form in the right corner of the Table.

After categorization, the number and distribution of acts in different group situations were compared. This also served as a reliability measurement of analyzing processes performed by the coder. For this comparative and quantitative content analysis, registered acts were collected under four main classes of Bales: positive reactions (acts from categories 1-3), attempted answers (categories 4-6), questions (categories 7-9) and negative reactions (categories 10-12), and an analysis of variance (SPSS ANOVA) was performed.

Results

General findings

Anatomy and physiology: A total of 33 acts between students were registered during anatomy and physiology observation periods. The distribution and differences of acts between anatomy and physiology group situations are presented in Figure 1. As can be seen the students were task-oriented (Bales 7-9) in both situations. However, there were also passive students in anatomy period, who did nothing and who accepted passively the ideas of others. Some students showed anxiety and tension by repeating desperately the same questions (but did not receive a response from their peers). Thus, they expressed their emotions and were negatively emotion-oriented (Bales 10-12).

Radiology: A total of 758 acts were registered during the observation periods. The distribution and differences of students' acts on a day by day basis are illustrated in (Figure 2). In general, the students' behavior was emotionally characterized during all observation periods. The students were continuously positively oriented (Bales 1-3) because they gave help and showed satisfaction, had sometimes periods of laughing that were important for tension release and could agree with each other. However, they showed also disagreement, the central act in the negative reactions category. This means several verbal “no” reactions against either suggestions and factual questions or opinions made by their peers.

Beside the Bales' main categories it was recorded under “task-oriented acts” that the students both cooperated – shared their duties into parts which must be performed individually but which are ultimately the group's learning outcome, and collaborated – worked as a group consistently through the process of problem-solving. The term “cooperation” was descriptive for example when one of the students was observed to act as an information-seeker (read a book out aloud and gave information), whereas another behaved like an IT-expert

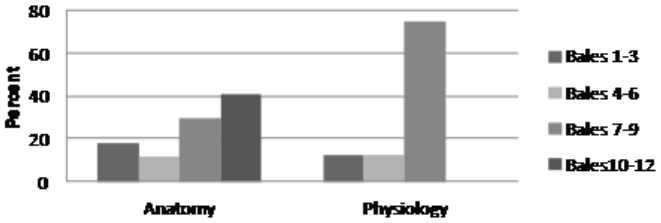

Figure 1: Distribution and differences between anatomy and physiology group situations.

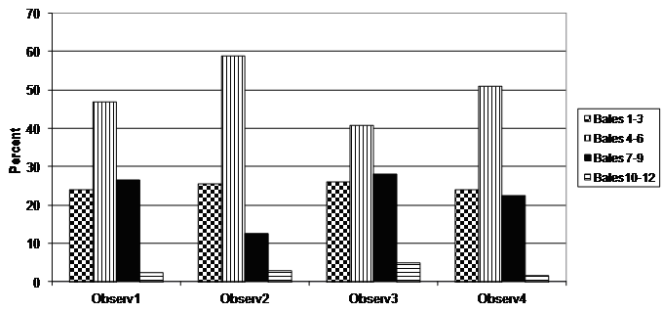

Figure 2: Distribution and differences between four observation times.

and supervisor of radiology program (gave opinions, reported, asked for suggestion) and a third was a (critical) commentator of her peers (agreed or disagreed, asked for repetition). However, at other times the same students struggled with same problems all together with no clear division of duties, and thus the definition of "collaboration" was introduced.

Differences between anatomy and physiology group situations

Students' reactions were similar in anatomy and physiology learning environments except emotion-oriented negative reactions in anatomy period. The difference was statistically significant (χ^2 (3) = 10,061, $p<0.05$). Contrast to physiology period with positive emotions and task-oriented working spirit, the students gave not help as much, and were not interested in each other's feelings in anatomy context. Many of those reactions, which would have been categorized as neutral questions (asks for information and suggestion, Bales 7, 9) in physiology period, had become expressions of anxiety and uncertainty because of their lonely and desperate tone.

Differences between radiological group situations

The students were situated within an emotionally safe and constant learning environment with no pedagogical differences between the sessions on different days. However, there were statistical differences ($p<0.05$) between the second and the third group situations when the task-oriented categories (4-6 and 7-9) were compared. On Day 2, the students gave suggestions and opinions, and repeats facts more than actively asked facts and advice. Respectively, on Day 3, they were better concentrated on both questions and attempted answers (Figure 3). In general, there were no differences between students' reactions except once; between student group's Day 2, which was also inconsistent with the results from other days.

Teacher's checklist in a radiology context

In the teacher's evaluation, the students' behavior was positively described. The students helped each other, showed satisfaction and openness. They agreed but also disagreed with each other without tension and aggression. In general, the teacher's responses were in agreement with the structural observations, with the exception of category 8, related to personal, emotionally neutral questions in which another's opinions, feelings, values, intentions and inclinations were inquired. According to teacher, there were no acts in this category.

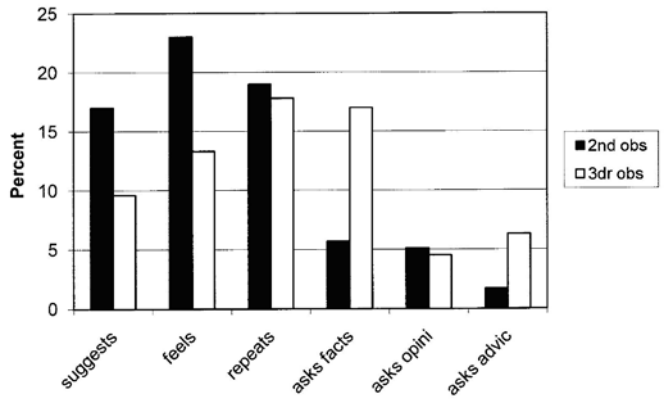

Figure 3: Differences between the 2nd and the 3rd observation periods.

Discussion and conclusions

This study concentrated on the nature and quality of group work. Despite that fact that the research on group affective states is still in the early stages after this study mainly because of small set of data, using Bales' framework it was observed that the students were exposed to an emotionally safe and constant learning environment. This may be a result of the close peer relationships established during their long shared study history. Despite the disagreements, they were more team-players (and friends) than competing individuals. It was true at least among these students that group learning is a pleasant method for meeting peers [12] Simultaneously, it was not necessarily a best task-based learning experience. Maybe much is depending on the number of students physically present; in the group with only 2-4 students, the suggestions, feelings and opinions remained unrelated acts of isolated individuals. But in the groups with 3-4 students there was a more balanced distribution of both questions and attempted answers.

It was also true that the increased number of students did not always increase the quality of task-oriented interaction. It provides an opportunity of the disengagement, which was seen during the anatomy period. In addition, there were momentary changes in group dynamics in radiology context, which meant several discussions and extraordinary nonverbal acts in progress at the same time in all observation periods with more than two students (two students turn away from the speaker and initiate discussion of their own). In order to avoid this type of sub-group fragmentation, a more effective learning environment should be established. It is natural that the motivation and mental resources of students vary during the case and study week, and thus students might need their teacher's help to maintain task-oriented discussion running as is the case in the study of small-group interaction in the ambulatory clinics [16]. A complicate factor is that in normal situations, the teachers do not observe students' behavior when they work with each other. The students do not ask each other's opinions, feelings, values, intentions and inclinations in front of their teacher. For them, the teacher- rather than other students - is a learning resource, respected expert, and then Vygotsky's idea of social learning with peers is not really internalized.

It was not possible in this study design with only one observer to separate students' task-oriented acts in categories named "patients' problems" and "students' own problems" (see task-oriented categories in (Table 1), even if such additional categories would clearly need. The distributions of these categories should offer important information for teachers designing and establishing new social learning-based learning environments. For further model construction purposes the following categories of behavior among students without their teacher are suggested: initial phase: rising interest (task-oriented with minimal emotional reactions), middle phase: dispersed interest (task- and emotion-oriented reactions), final phase: returning interest (task- or emotion-oriented reactions) with a structured variation in task- and emotion-oriented behavior.

Conclusions

The behavior of teachers in teacher-led sessions previously investigated conveyed a positive and friendly atmosphere for learning [16]. In present study, when concentrated only on students' self-directed learning sessions, positivity was also identified. However, sometimes it means less patient-oriented (task-oriented) discussion been replaced by chat around students' own affairs. This variable interest was already warned by Kelly and Spoor [17] and was sporadically reported in a face-to-face ambulatory clinic setting after the patient encounter

[16] as well as in students' own descriptions about their group work [15], but lacked totally in an asynchronous online implementation [32] and in first-year students' interaction [33] previously studied. On the other hand, first year veterinary students participated in PBL curriculum setting (face-to-face and without their teacher's continuous guidance, but according to steps defined), showed both satisfaction and professional behavior simultaneously in a physiology context [33]. It can be carefully concluded then that there is a need for support – or strictly defined guidelines adopted from PBL principles - from first year to final year despite the professional development of the students.

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