

The Effect of Group-Dynamics, Collaboration and Tutor Style on the Perception of Professional Stereotypes: A Quasi-Experimental Pre-Post-Design on Interdisciplinary Tutorial Groups.

Eva Hammar Chiriac (✉ eva.hammar.chiriac@liu.se)

Linköpings universitet <https://orcid.org/0000-0002-7117-5620>

Endre Sjøvold

Norwegian University of Science and Technology

Alexandra Björnstjerna Hjelm

Linköpings universitet

Research article

Keywords: Interprofessional collaboration, Group-dynamics, Interprofessional problem-based learning (iPBL), Spin theory, SPGR, Observation, Professional stereotypes, Tutor style.

Posted Date: November 9th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-101132/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published at BMC Medical Education on July 10th, 2021. See the published version at <https://doi.org/10.1186/s12909-021-02814-5>.

Abstract

Background: Group processes in inter-professional Problem-Based Learning (iPBL) groups have not yet been studied in health-care educational context. In this paper we present findings on how group-dynamics, collaboration and tutor style influence the perception of professional stereotypes of students collaborating in iPBL groups. Health-care students are trained in iPBL groups to increase their ability for collaboration between healthcare professionals. Previous research focusing iPBL in healthcare, infers that more systematic studies are desired, especially concerning interaction between group processes, and internalized professional stereotypes. The aim of this study is to investigate if changes in group processes, collaboration and if tutor style, influence the perception of professional stereotypes of physician- and nurse-students.

Methods: The study is a quasi-experimental pre- post-design. The participants included 30 students from five different healthcare professions, mainly medicine and nursing. Other professions were physiotherapy, occupational therapy and speech therapy. The students were divided into four iPBL groups, each consisting of six to nine students and a tutor. Data were collected through systematic observation using four video-recorded tutorials. SPGR (Systematizing the Person Group Relation), a computer-supported method for direct and structured observation of behavior, were used to collect and analyze data.

Results: Traditional stereotypical professional behaviors were identified in the first observed group meeting. Although the groups followed different paths of development, the group-dynamics changed in all groups over the six weeks of collaboration. Two of the groups became more cohesive, one more fragmented and one more polarized. Stereotypical behaviors became less frequent in all groups. Our findings indicate that tutor behavior has a strong influence on the development of the group's dynamics.

Conclusion: Our findings strongly suggest iPBL is a mean to reduce stereotypical behaviors, that may positively increase member's ability for inter-professional collaboration. Although the pattern of dynamics took different forms in different groups, we argue that iPBL forces students to see the colleague behind his or her profession, thus breaking professional boundaries. The tutor style significantly influenced the iPBL groups development. This study contributes to our field by emphasizing the effect of group-processes to increase mutual understanding across professions.

Background

The use of in inter-professional Problem-Based Learning (iPBL) groups in healthcare education is used as a means to increase collaboration between pre-qualified students from different healthcare specializations. IPBL, an approach aligning problem-based learning (PBL) [1, 2, 3] with Interprofessional education (IPE) [4, 5, 6], can be defined as curricular activities in which students in groups composed of students from different medical programs “learn from, with and about each other to improve collaboration and the quality of care” [5 p. 192, 7 p. 6, 8, 9 p. 51, 10 p. 60]. Such interactions between students are supposed to create training synergies and collaboration skills in a heterogenous group of

healthcare students and to facilitate a better understanding of other professions [5, 6, 11, 12]. Freeth and colleagues [5] emphasize the need to distinguish between (a) learning *about*, for instance acquiring an understanding of other professional roles and how to reduce stereotypical associations, (b) learning *with*, which is team work and collaboration and (c) learning *from*, which is connected with trust, respect and confidence in the competence of other professionals.

Researchers studying pre-qualified students in healthcare education seem to agree on the efficacy of both PBL and IPE and that there is a strong incentive for its using iPBL in healthcare education [4, 5, 6]. IPBL facilitates the acquisition of collaborative knowledge, skills and attitudes enabling collaborative practice [13]. In a review including 83 studies between 2005–2010, Abu-Risch and colleagues [4] concluded that research about IPE in healthcare education has foremost reported on four major themes, partly confirmed by complementary research; a) *students learning* [9, 14], b) *professional roles/identification* [15, 16], c) *communication* [17, 18, 19], and d) *overall satisfaction with IPE* [6, 14, 21]. However, we would like to add another theme: e) implementation and development [6, 21, 22]. Still, studies on IPE, thus also iPBL, and group processes in general and groups' development specifically are lacking; this is thus a research gap requiring further research [19, 23].

In order to secure and sustain safe and effective healthcare, developed interprofessional collaboration between the increased number of healthcare professions is an absolute requirement [9, 12, 13, 24, 25] using iPBL [26]. Previous studies have shown that professional stereotypes may be a barrier to collaboration both in education [15, 19, 20, 27] and in practice [28, 29]. Research on the perception of professional stereotypes of physician- [18, 30] and nurse-students [31] have received most attention. Nurses are described as warm, empathic and caring, whereas physicians are seen as independent, active and domineering, thus showing the traditional roles [15, 17, 18]. Furthermore, studies have consistently shown that professional stereotypes are persistent [29, 32, 33, 34] and even influence students before they have entered healthcare education [15, 20]. Thylefors [27] went so far as to argue that at the beginning of their education medical students already identify with their future profession and stated that prejudices about different professions influence their choice of education. A conclusion later confirmed by Athea et al. [20] and Pietroni [34] revealed that students provided stereotypical images of their own and others' professions .

The fundamental/basic idea of iPBL is that the group processes are the main vehicle of learning, carried out/applied/implemented in interactions with other students in in a tutorial group lead by a tutor [3, 19, 23]. PBL being a student-centered approach that promotes self-directed learning, problem solving and group processes as a means for learning is naturally suitable for IPE [4, 5]. In iPBL active contribution to the group's joint work is mandatory, facilitated by vignettes enabling collaborative practice [5, 9, 11].

Even though research has not been able to provide the characteristics of effective tutoring in neither PBL nor iPBL [3, 11, 19, 35, 36], researchers seem to agree on that the tutor's should act/ behave in accordance with the philosophy of PBL [3, 19, 37, 38] facilitating the process rather than delivering content. The

tutor's role and behavior are best negotiated and developed through interactions with each tutorial group and must be adapted to the group's development and to the context (i.e. the task and group composition).

The aspects of group-dynamics [19, 23] and leadership [5, 11] in iPBL is highly understudied. Recent research emphasize that different contexts demand different dynamics for a group to be effective [39, 40, 41, 42, 42, 44]. In spin theory [43, 44] the construct balance is used to explain how group dynamics may change to suit contextual demands. In a stable context with simple tasks, a group may be effective with a fixed role-structure and strong leadership, but with increased complexity and ambiguous tasks, a more flexible role structure is needed. One would expect an iPBL group to develop a flexible role-structure to be successful since the learning situation demands shared situational awareness and equal contributions from the group-members from/belonging to different health-care educations.

The operationalization of the spin-theory is labelled SPGR (Systematizing the Person Group Relation) and is a structured method for observing group behavior including algorithms for analyzing distribution of influence, polarization, degree of opposition and other important aspects of group-dynamics. SPGR has been developed and refined over the last forty years based on the observations of thousands of groups [29, 44, 45, 46, 47 48, 49]. The Norwegian Armed Forces have used SPGR in their training of military groups for more than twenty years.

Methods

Aim

The aim of this study was to investigate if changes in group processes, collaboration and if tutor style, influence the perception of professional stereotypes of physician- and nurse-students.

1. Are professional stereotypes of physicians and nurses reflected in the students' initial behaviors in the iPBL groups?
2. Are there any changes in the dynamics of the iPBL groups over the six weeks of tutoring, and if so, in which way is the inter-professional stereotypes influenced?
3. Does the tutor's behavior influence the group's development and collaboration and, if so, how?

Design

The study is designed as a quasi-experimental pre-post study in which the groups are videotaped and observed at the start of the group sessions and at their final meeting. Each tutorial group consisted of a tutor and a mixture of six to nine students of medicine and nursing and from other healthcare education such as physiotherapy, occupational therapy and speech therapy. All tutorial groups included in this study were natural groups in an authentic situation. We used direct observation to investigate the development of dynamics in four tutorial groups. We based our observations on video recordings of two group

sessions separated by a six-week interval and used SPGR-software to directly observe group behavior to map and analyze our data using a validated category system [44, 47].

Participants

The participants came from a cohort of 400 healthcare students at a large university in a medium-sized Swedish city during the second semester of their professional education. All students had at least one term experience of PBL and participated in the mandatory six-week course in interdisciplinary collaboration. A total of 35 people from four tutorial groups agreed to participate in this study. Thirty of the 35 were students (21 women and 9 men) between 19–40 years of age and five were tutors (all female). All tutors were experienced tutors and had undergone compulsory college pedagogical tutorial group education.

Data Collection

The four tutorial groups were video recorded using three to four cameras in each session. The cameras were up and running before the session started. The researcher was not present in the room during the sessions. We observed the first and the last sessions of each group. In each session, we observed a) the beginning, b) the choice of problem formulation (approximately the middle of the session) and c) session evaluation (the last activity). Thus, the observations spanned a period of time both between and within sessions, allowing us to get a fair picture of the development of behavior in the tutorial group. In total, this study builds on observations of four-hour video recordings.

The SPGR system for direct observations of group behavior

In the SPGR system, behaviors supporting the four group functions are grouped in twelve categories (Table 1), [44, 46, 47]. Direct observation of groups using SPGR is supported by touchscreen-based software by which a trained observer registers a) which person acts and towards whom, b) what behavioral category best describes the act and c) whether the act was verbal or non-verbal. Hence, each registration included three decisions.

Table 1

Overview of the SPGR system for direct observation of group behavior [46 p. 112–113, 47 p. 310].

Main category <i>sub-categories</i>	Typical behavior	Body language
Control (C) (Result-oriented)		
<i>C1 Ruling</i>	Controlling, authoritarian, follows rules and procedures.	Clear and demanding body language.
<i>C2 Task-oriented</i>	Objective, efficient, analytical, adheres to the task.	Neutral; slightly formal body language.
Nurture (N) (Relation-oriented)		
<i>N1 Caring</i>	Empathetic, thoughtful, sociable, protective, compassionate	Open facial expression and body language, good eye contact.
<i>N2 Spontaneous</i>	Creative, spontaneous, emotional, cheerful entertaining	Expressive body language with large gestures.
Opposition (O) (Correction-oriented)		
<i>Criticism (O1)</i>	Provocative, selfish, oppositional, against authorities, arguing, on the verge of aggressive, non-conformal (non-uniform).	Aggressive, active, discouraging body language. Often behaves as if on the go.
<i>Assertiveness (O2)</i>	Competitive, stubbornly degrading, self-confident, arrogant.	Rejecting, dominating body language.
Dependence (Obligation-oriented)		
<i>Loyalty (D1)</i>	Passive, obedient, conformist, dutiful, agreeing, understanding, patient, careful.	Submissive, neutral body language; small gestures.
<i>Acceptance (D2)</i>	Confident, trusting, satisfied, initiative less submissive, acceptance of the group.	Nice, expectant body language.

Main category	Typical behavior	Body language
<i>sub-categories</i>		
Withdrawal (W) (Dissolution)		
<i>Resignation (W1)</i>	Dejected, low-spirited, passive, lack of will to fight, contribute and cooperate	Detached, rejecting and closed body language.
<i>Self - sacrificing (W2)</i>	Passive, sad, on the edge of tears, withdrawn, offended, accusing, expressing that things are unfair and boring, victimized, displaying ignorance.	Closed and tense body language.
Synergy (S) (Teamwork)		
<i>Engagement (S1)</i>	Constructive, collaborative, inclusive, energetic, encourages participation.	Active and lively, body language, inviting, direct eye contact
<i>Empathy (S2)</i>	Listening, understanding, empathetic, supportive of others, interested in others	Lively body language, inviting and confirming, seeking eye contact.

The four first categories C, N, O and D cover behavior supporting the four basic group functions. Category W covers behavior that may lead to dissolution of the group and category S covers behavior that enhances collaboration.

The data are analyzed post-observation using SPGR algorithms which produce both statistics and the group's dynamic (Fig. 1a, b–4a, b). These analyses and diagrams let us evaluate the role structure by the position of each member in the social field and the distribution of influence in the group using the circle size of each person. Analysis of inter-rater reliability on a 10% sample of the data showed an acceptable level of agreement (69%). The study also has high face validity as both researchers involved in the registration subjectively and independently recognized the different tutorials when seeing the field diagrams.

Results

There were four groups in this study, with a group size varying from six to nine students. All groups had three physicians and the number of nurses varied from one to three. The rest of the members came from other healthcare professions, such as physiotherapy, occupational therapy and speech therapy. Each group had a tutor. Over the six-week period, the activity of all four tutorial groups was dominated by task-oriented behavior, but their group-dynamics differed and their development over the observed period took

different paths. Groups 1 and 3 (Figs. 1a, b and 3a, b) became more cohesive, whilst Group 2 (Fig. 2a, b) became more fragmented and Group 4 (Fig. 4a, b) more polarized.

In Figs. 1a, b to 4 a, b, each person is mapped in SPGR field diagrams. Each person is marked by a circle. If the person shows mainly task-oriented behaviour, the circle is positioned in the upper sector of the diagram, mainly caring behavior in the lower right sector and mainly opposing behavior in the lower left sector. Larger circle sizes indicate dominant behavior. The left field diagram represents observations from the first group session and the right diagram from the last.

Tutorial Group 1

Tutorial group 1 consisted of one tutor and seven students; three physicians (Phy1a, Phy1b and Phy1c), three nurses (Nur1a, Nur1b and Nur1c), and one other healthcare profession (Fig. 1a, b).

The First Tutorial Group Session

The predominant behavior of all members was task-oriented (located in the upper sector of the diagram). The group was somewhat fragmented. Nur1b and Phy1b join in a subgroup toward the opposing sector (lower left). Phy1a and Tutor1 are the most dominant members (largest circle size), while Nur1a and Nur1b are the most submissive. The position of Phy1c and Tutor1, with balanced task-oriented and dominant behaviors, indicates that they played leading roles and were willing to support other group members. For example, when Nur1c had trouble starting an online contact group, Phy1c immediately presented his/her laptop and offered to help; Phy1c: "If you access this page... wait, I'll show you." This is in contrast with Nur1b's reaction when Nur1c was late for the session; Nur1b: "Showing up on time is important, isn't it?" and Nur1c's reaction: a gentle smile, downward gaze and closed body-language. Tutor1 mostly used non-verbal behaviors such as nodding and consistently looking at whoever was speaking, but, as her large circle indicates, this had a significant influence on the group.

The Last Tutorial Group Session

During this session, the group displayed more cohesion, with all members contributing more equally (larger and equally sized circles) to the task. Phy1b has moved from opposition to show supportive behaviour, albeit in a submissive manner. Nurs1c had moved from being submissive to the most enthused. Tutor1 is not as much in charge and instead plays a highly supportive role.

Summary of the Tutorial Group's Development

Over the six weeks of interprofessional work, the tutorial group had evolved into a more cohesive group and the initial pattern of subgroups and fragmentation had dissipated. All the nurses acted according to their professional stereotypes; being fairly submissive in the first session and more balanced and active in the last. The entire group moved slightly towards the lower right sector, representing more relationship-oriented behavior.

Tutorial Group 2

Tutorial group 2 consisted of one tutor (Tutor2) and eight students. Three physicians (Phy2a, Phy2b and Phy2c), two nurses (Nur2a and Nur2b) and three students from other healthcare professions. The averages of observed behavior for each person in the two sessions are presented in Fig. 2a, b.

The First Tutorial Group Session

Two members, Tutor2 and Phy2a, show strong task-orientation and dominance, polarized to the other members that are rather submissive (smaller circle sizes). Phy2c is the only one showing mostly relation-oriented behavior and is the one farthest away from the group. All physicians showed behavior more dominant than the nurses and strongly influenced the group's work, again according to their professional stereotypes. This is illustrated by an interaction during the meeting between Phy2a and Phy2c. After some back and forth discussion of when individual contributions should be delivered, Phy2a stated firmly "You who've got children, just upload your work when the children are in bed". Phy2c replied with a gentle smile: "We are just talking about one or two pages, not a thesis." When evaluating the group's work, Phy2c stated: "Some have worked more than others!" which was confirmed by another member: "Yes, it feels like we've let the others do the job for us." Tutor2 was rather authoritarian, for example when telling the group what to include in their texts: "There must be some facts in some way. But you do understand that it can't be 17 pages, it gets far too long." Interactions in the group are best described as fragmented, with several members appearing withdrawn and evasive.

The Last Tutorial Group Session

In this session, the group dynamic was quite different. Phy2a and Tutor2 still have dominating roles but are now accompanied by Nur2b and Phy2c. Phy2c's nurturing role in the first session is now handled by two others in combination. Phy2b and especially Nur2a are now in opposition to the rest of the group, and the group is even more fragmented than in the first session.

Summary of the Tutorial Group's Development

The fragmentation and tendency to polarization that were observed in the first session emerged more clearly in the last session. Over the intervening six weeks, all members have become more active, but not more collaborative and two members (Phy2b and Nur2a) are now in opposition.

Tutorial Group 3

Tutorial group 3 (Fig. 3a ,b) comprised two tutors (one in the first session and one in the last session) and six students: three physicians (Phy3a, Phy3b and Phy3c), two nurses (Nur3a and Nur3b) and one other healthcare profession. Their tutors are labeled Tutor3 in both cases

The First Tutorial Group Session

All members showed task-oriented but submissive behavior, except Tutor3 who was both dominant and demanding. For example, when Phy3a asked: "Should we decide on our topic now?" Tutor3 replied firmly: "No, we are still brainstorming!" instead of throwing the question back to the group to encourage them to reflect on their own process and collaboration. Group 3 may be labeled a "strong leader – follower" group. This is seen in Fig. 3a, b, which shows one large circle around Tutor3a, with the other members represented by small circles (submissive behavior).

The Last Tutorial Group Session

In this session, Phy3a and Phy3b played more leading roles and all members contributed more equally. For example, when the group talks about how the social service demands that healthcare should promote social participation and Phy3b says: "I think that 30 minutes with someone cooking for him [the patient] would make a difference in many ways." The members agree, followed by a series of suggestions on how healthcare could promote social participation. Although Tutor3 still showed firm and dominating leadership, the group had become more cohesive.

Summary of the Tutorial Group's Development

In the first session, the group consisted of a strong leader, Tutor3, and followers. By the last session, the group had become more cohesive with more equally contributing members, even though Tutor3 remained authoritarian.

Tutorial Group 4

Tutorial group 4 (Fig. 4a, b) consisted of a tutor (Tutor4) and nine students: three physicians (Phy4a, Phy4b and Phy4c), three nurses (Nur4a, Nur4b and Nur4c) and two other healthcare professionals.

The First Tutorial Group Session

Most members showed mostly task-oriented behavior. Tutor4, Phy4c and another member formed a leading coalition, while Phy4b and Nur4c show passive opposition. A subgroup of followers (Nur4a, Phy4a and Nur4b) was somewhat in opposition to the leading coalition, with Nur4a in a leading role (the largest circle). An example of submissive behavior occurred when Phy4a said to another student who was standing writing at the board, in a very quiet voice, that the message needed to be repeated. An example of passive opposition is Nur4c's constant checking of his/her mobile phone whilst the others were involved in discussion.

The Last Tutorial Group Session

In this session, a change of the group's dynamics was evident, with even stronger polarization between two more distinct sub-groups. One dominant and opposing sub-group (Nur4a, Phy4c, Tutor4 and another) versus a cohesive and submissive sub-group (Phy4a, Nur4b, Nur4c, Phy4b and one other), trying its best to be supportive and encouraging. A typical example of communication between the sub-groups occurred during the discussion of whether a patient with dementia should drive a car or be offered a travel service.

Phy4c: “We do not know enough; we only have his [the patient's] statement.” Nur4a: “What should we do then?” Phy4c “There is a test with different scales that are recommended...”

Summary of the Tutorial Group’s Development

During the six weeks, tutorial group 4 developed from a fragmented and somewhat polarized group to a strongly polarized group, with an opposing and dominant subgroup towards a cohesive and submissive sub-group committed to task-oriented collaboration. Tutor4 was part of the dominating sub-group in both sessions.

Discussion

There is a growing demand for iPBL to introduce interprofessional collaboration between pre-qualified healthcare professions already at the educational stage [4, 5, 6] as a way to improve the safety and efficacy of patient care [12, 24]. There seems to be an overall agreement on the efficacy of iPBL and that it fosters collaborative practice [4, 5, 20]. One large university in Sweden has adopted this approach, with students from different healthcare programs learning together in interprofessional tutorial groups [9, 13, 25] using PBL [2]. This raises questions of group processes and whether they are influenced by physician and nurse professional stereotypes, not to mention the tutor’s role over sessions in inter-professional tutorial groups in PBL. This study examined group processes and leadership in interprofessional tutorial groups, an under-investigated field of research [2, 5, 19].

Four Tutorial Groups – Two Patterns of Group Development

The group dynamics in all four groups changed over the six weeks of collaboration, although following different paths. Two of the groups (group 1 and 3) became more cohesive with a higher quality of intra-group communication, whereas groups 2 and 4 became, accordingly, more fragmented and polarized [44,47], suggesting a reduced quality collaboration. The distribution of influence among group members is an important parameter of group dynamics. All groups showed a more equal distribution of influence in the second session, and stereotypical behavior became less frequent. In these two aspects all groups improved, indicating that interprofessional collaboration took place [4, 5, 6, 10, 16]. Group 1 became more relationship-oriented by the last session, whilst the pattern of activity in group 2 remained unchanged. Groups 3 and 4, on the other hand, becoming even more task oriented. Tutorial group 1 showed in addition less opposing behavior, while tutorial group 2 showed more opposition. Members of tutorial group 1 also increased their contribution over the six weeks period. Combined with a more equal distribution of influence than the other groups, we can conclude that the developmental trajectory of this group was superior to those of the other three groups [44, 47].

Stereotypical Behaviors

Three of the four tutorial groups showed more professionally stereotypical behaviors in the first session than the last. In session 1, the physicians in groups 1, 2 and 4 dominate [18, 30] and behave in a way that is consistent with physician stereotypes [29, 32, 33, 34]. The nursing and other healthcare students all behaved submissively in the first group session, consistent with the stereotypical role of nurses [15, 17, 20, 21, 50]. In the last group session, the physicians

no longer dominated; the influence of the other students had increased. One interpretation is that during the first session, the physicians in groups 1, 2 and 4 presented a positive example that inspired collaboration and encouraged all group members to engage [11, 15, 29, 50]. In addition, a few physicians were more submissive during the 6-week course. Tutorial group 3 showed a different pattern, as all the students were submissive in session 1. The tutor alone behaved flexibly and dominated the group. In the last group session, however, almost all group members behaved more flexibly, hence promoting beneficial collaboration.

Our results are in accordance with previous research showing that stereotypical professional behavior and preconceived notions about one's chosen profession and its allied professions are deep rooted and difficult to change [21, 27, 30, 50]. Being locked into professionally stereotypical behavioral patterns may have a negative impact on interprofessional collaboration meaning that not all group members' competences are fully exploited [15, 16, 29, 49]. Neither the development nor the performance of such groups is optimal. Our findings suggest, however, that iPBL may loosen professional stereotypes (e.g. physicians become less dominant and nurses less submissive).

iPBL

One of the premises of spin theory is that a well-functioning group should be able to adapt to different contexts and tasks [44, 47]. This aligns well with iPBL, which is a student-centered, context-dependent approach to learning [3, 13, 19] a point further emphasized by Freeth et al. [5], hence, being a student-centered, problem based self-directed learning context in which the interprofessional tutorial groups constitute learning collaboration, the utilization of all members' competences and contributions, problem-solving and reflection are natural components of the work of iPBL groups [9, 11, 19]. The students who participated in this study were used to PBL, but what was new to them was the interprofessional composition of the tutorial groups. One interpretation of the results is that the iPBL method played a role in the breaking down of professional roles and increasing of behavioral flexibility during the six-week course. This is in line with previous research suggesting that iPBL is more naturally suited for increasing collaboration between pre-qualified students from different healthcare specializations [4,5] but is something that needs further investigation.

The Effect of the Tutor's role on the Success of iPBL

Even though we argue that iPBL is a good way of breaking down professional boundaries, it is clear that the effects are strongly influenced by the tutor's role and behavior [2, 3]. In all groups, the tutor was clearly active, dominating, directing and setting the agenda for the group's work. Whilst this may not, at first sight, appear consistent with the principles of iPBL, it reflects the principle that tutors should facilitate the processes of the group rather than deliver content (11, 19, 35]. The chances of a successful group dynamic evolving are maximized if the tutor's role and behavior is negotiated and developed in interactions with members of the group and adapted to the context.

In one group (tutorial group 1), the tutor showed significantly more mediating behavior than the tutors in the other three. This group followed the most positive developmental trajectory, becoming more cohesive and more self-managing, with members having more similar influence in the last session than the first. By the last session, the tutor had moved from a task-oriented role to a more supportive and caring one, which is consistent with a desirable development of the tutor's role in iPBL [3, 19, 36, 37] In all the other groups, the tutor initially had a more directing and authoritarian facilitation style that endured and was still clearly evident in the last session.

None of the other groups were as successful as group 1, although group 3 had a fairly positive developmental trajectory. The members of group 3 were all rather submissive and although the group became more cohesive, the tutor's task-oriented behavior persisted. The difference between group 3 and groups 2 and 4 was that in the latter groups the authoritarian tutor was part of a dominant sub-group in session 1. We argue that this association is the main reason for the negative development of these two groups. Whilst we argue that iPBL is a good way of breaking down stereotypical behavior in groups, we also argue that the tutor's role is a vital factor in the success of the approach.

Limitations

The main limitations of this study are the small number of groups and that the analysis is based on observations of just four hours of video recording. Ideally, we would enlarge our study and include more groups "but that does not justify ignoring the information we could obtain" [51]. Using natural groups in an authentic situation affects the availability of participants. The level of inter-rater reliability (69%) might be considered a limitation but given that each registration was actually based on three decisions (who acts towards whom, category and verbal or non-verbal; see Method section), it can be considered good enough and correspond to what can be expected when each of the registrations actually corresponds to three decisions identical assessments. We argue that despite these limitations, the analysis of a small sample can lead to interesting insights.

Conclusion

The aim of this study was to investigate if changes in group processes, collaboration and if tutor style, influence the perception of professional stereotypes of physician- and nurse-students. We found a clear pattern of behavior reflecting professional stereotypes of nurses and physicians in the initial group

observation and that all four tutorial groups changed their group's dynamics over the six weeks of the course. Important elements of group-dynamics like distribution of influence, polarization and opposition behavior changed, but the pattern of group-dynamics took different forms. Two of the groups became more cohesive, one more fragmented and one more polarized.

Our findings suggest that stereotypical professional behaviors are already present among students of different health-related professions. Physicians' classically dominant position versus the more submissive approach associated with nurses were observed in the initial session of this study. However, in the last sessions, when groups had been working together for six weeks, stereotypic behaviors became less frequent. We argue that iPBL forces students to see the person behind the profession rather than the professional stereotype. An important aspect of iPBL is that all members must contribute equally for the problem to be solved.

Apart from observing fewer professional stereotypes in the second observation, we found that tutor's behavior strongly influences group-development. The groups in which the tutor's role was consistent with the principles of PBL showed an improvement in group-dynamics and collaboration.

Declarations

Acknowledgements

We want to acknowledge the IPL research group at Linköping University, Prof. M. Abrandt Dahlgren, PhD, M. Ekstedt, PhD, G. Larsson Torstensdotter, PhD, student Tove Törnqvist and Asst. Professor Sally Wiggins, who contributed to this article by compiling data and participating in the initial discussion of the results.

Authors' contributions

The research is the authors' original work and has not received prior publication elsewhere and is not currently under consideration by another journal. ABH conducted the observations. All three authors have materially participated in the research and in the article preparation. All three authors have approved of and agreed to submit the final version of the manuscript to BMC Medical Education

Funding

No funding to declare.

Availability of data and materials

The data generated and analysed during the current study are not publicly available due to existing ethical agreements in the project, participants' anonymity and confidentiality and out of respect for the participants sensitive contribution. Data are however available from the authors upon reasonable request.

Ethics approval and consent to participate

The study was conducted in accordance with the ethical guidelines of the British Psychological Society [52], which emphasizes concern for participants' interests. All students and tutors gave written, informed consent to participate in the study. The research project of which this study is part of was approved by the regional Research and Ethics Committee at Linköping University, Sweden (Dnr 2016/439-31).

Consent for publication

Not Applicable

Competing Interest

The authors report no conflicts of interest.

Author details

¹Department of Behavioral Sciences and Learning, Linköping University, SE-581 83 Linköping, Sweden

² Department of Industrial Economics and Technology Management, Norwegian University of Science and Technology, NTNU, Norway

References

1. Barrows, H. (1986). A taxonomy of problem-based learning. *Medical Education*, 20 (6): 481–486. doi:[11111/j.1365-2923.1986.tb01386.x](https://doi.org/10.1111/j.1365-2923.1986.tb01386.x)
2. Öystilä, S. (2006). The significance of group dynamics in problem-based learning. In E. Poikela & A. Raija Nummenmaa (Eds.) *Understanding problem-based learning* (pp. 161–180). Tampere, Finland: Tampere University Press.
3. Wiggins, S., Hammar Chiriack, E., Larsson Abbad, G., Pauli, R., & Worell, M. (2016). Ask not only 'what can PBL do for psychology?' but 'what can psychology do for PBL?' A review of the relevance of problem-based learning for psychology teaching and research. *Psychology Learning & Teaching*, 15 (2): 136–154. doi: [10.1177/1475725716643270](https://doi.org/10.1177/1475725716643270)
4. Abu-Risch, E., Kim, S., Lapio, C., Varpio, L., Malik, E., White, A.A., Craddick, K., Blondon, K., Robins, L., Nagasawa, P., Thigpen, A., Chen, L-L., Rich, J., & Zierler, B. (2012). Current trends in interprofessional education of health sciences students: a literature review. *Journal of Interprofessional Care*, 26 (6): 444–451. doi:[3109/13561820.2012.715604](https://doi.org/10.3109/13561820.2012.715604)
5. Freeth, D, Savin-Baden, M, & Thistlethwaite, J. (2019). Interprofessional Education. In T. Swanwick, K. Forrest & B. O'Brien (Eds.), *Understanding Medical Education: Evidence, Theory and Practice* (3rd edition) (pp. 191–206). New York: John Wiley & Sons Ltd.
6. Vyt, A., Pahor M., & Tervaskanto-Maentausta, T. (Eds.) (2015). *Interprofessional education in Europe: Policy and practice*. Antwerp, Belgium: Garant.

7. Barr, H. (2002). *Interprofessional education: Today, yesterday and tomorrow*. London: LTSN for Health Sciences and Practice.
8. (2019). *Welcome to CAIPE: The Centre for the Advancement of Interprofessional Education*. Retrieved from <https://www.caipe.org/>
9. Lindh Falk, A., Dahlberg, J., Ekstedt, M., Whiss, P., Heslyk, A., & Abrandt Dahlgren, M. (2015). Creating spaces for interprofessional learning: Strategic revision of a common IPL curriculum in undergraduate programmes. In A. Vyt, M. Pahor & T. Tervaskanto-Maentausta, (Eds.) *Interprofessional education in Europe: Policy and practice* (pp. 49–65). Antwerp, Belgium: Garant.
10. Thistlethwaite, J. (2012). Interprofessional education: a review of context, learning and the research agenda. *Medical Education*, 46 (1): 58–70. doi:10.1111/j.1365-2923.2011.04143.x.
11. Jewell, L., D'Eon, M., McKee, N., Proctor, P. & Trinder, K. (2013). Tutor experiences with facilitating interprofessional problem-based learning. *Journal of Research in Interprofessional Practice and Education*, 3 (2): 1–23. doi:10.22230/jripe.2013v3n2a100
12. World Health Organization. (2010). *Framework for action on interprofessional education and collaborative practice*. Geneva, Switzerland: World Health Organization.
13. Wilhelmsson, M., Pelling, S. Ludvigsson, J., Hammar, M., Dahlgren, L-O., & Faresjö, F. (2009). Twenty years of experience of interprofessional education in Linköping: Groundbreaking and sustainable. *Journal of Interprofessional Care*, 23 (2): 121–133. doi:10.1080/13561820902728984
14. Gudmundsen, A., Norebye, B., Abrandt Dahlgren, M., & Obstfelder, A. (2019). Interprofessional student meeting in municipal health service – Mutual learning towards a Community Community of Practice in patient care. *Journal of Interprofessional Care* 33 (1): doi:10.1080/13561820.2018.1515732
15. Adams, K., Hean, S., Sturgis, P., & Macleod Clark, J. (2006). Investigation of the factors influencing professional identity of first-year health and social care students. *Learning in Health and Social Care*, 5 (2): 55–68. doi:1111/j.1473-6861.2006.00119.x
16. Sollami, A., Caricati, L., & Mancini, T. (2018). Attitudes towards interprofessional education among medical and nursing students: The role of professional identification and intergroup contact. *Current Psychology*, 37 (4): 905–912. doi:10.1007/s12144-017-9575-y
17. Foronda, C., MacWilliams, B., & McArthur, E. (2016). Interprofessional communication in healthcare: An integrative review. *Nurse Education in Practice*, 19: 36–40. doi:1016/j.nepr.2016.04.005
18. MacArthur, B. L., Dailey, S. L., & Villagran, M. M. (2016). Understanding healthcare providers' professional identification: The role of interprofessional communication in the vocational socialization of physicians. *Journal of Interprofessional Education & Practice* 5: 11–17. doi:10.1016/j.xjep.2016.09.001
19. Wiggins, S, Abrandt Dahlgren, M., Ekstedt, M., Hammar Chiriack, E., & Törnqvist, T. (2020). The first PBL tutorial: Breaking the ice: How students present themselves to the group in an interprofessional problem-based learning context. In S. Bridges & R. Imafuku, (Eds.), *Interactional Research into Problem-Based Learning* (pp.197–223). West Lafayette, IN: Purdue University Press.

20. Ateah, A.A., Snow, W., Wener, P., MacDonald, L., Metge, C., Davis p., Fricker, M., Ludwig, S., & Anderson, J. (2011). Stereotyping as a barrier to collaboration: Does interprofessional education make a difference? *Nurse Education Today*, 31 (2): 208–213. doi:[1016/j.nedt.2010.06.004](https://doi.org/10.1016/j.nedt.2010.06.004)
21. Bell, A. V., Michalec, B., & Arenson, C. (2014). The (stalled) progress of interprofessional collaboration: the role of gender. *Journal of Interprofessional Care* 28 (2): 98–102. doi:[10.3109/13561820.2013.851073](https://doi.org/10.3109/13561820.2013.851073)
22. Lorentz, W. (2009). Europe, the professions and interprofessional education: An exploration in inter-culture relativity. *Journal of Interprofessional Care*, 23 (5): 432–441. doi:[10.1080/13561820903163454](https://doi.org/10.1080/13561820903163454).
23. Imafuku, R., Kataoka, R., Mayahara, M., Suzuki, H., & Saiki, T. (2014). Students' experiences in interdisciplinary problem-based learning: A discourse analysis of group interaction. *The Interdisciplinary Journal of Problem-Based Learning*, 8 (2): 3–13. doi:[10.7771/1541-5015.1388](https://doi.org/10.7771/1541-5015.1388)
24. Faresjö, T., Mogensen, E., & Ponzer, S. (2009). Framtidens vård kräver interprofessionellt samarbete [Future care requires interprofessional collaboration]. *Läkartidningen*, 13: 929–931.
25. Wilhelmsson, M. (2011). *Developing interprofessional competence: Theoretical and empirical contributions*. Linköping University, Department of Social and Welfare Studies, Sweden.
26. Dahlgren, L. O. (2009). Interprofessional learning and problem-based learning: A marriage made in heaven? *Journal of Interprofessional Care*, 23 (5): 448–454.
27. Thylefors, I. (2013). *Babels torn: om tvärprofessionellt teamsamarbete*. [Babylon's Tower: About cross-professional teamwork]. Stockholm, Sweden: Natur & Kultur.
28. Blomqvist, S. (2009). *The utilization of competence in multi-professional psychiatric teams*. Linköping University, Department of Behavioral Sciences and Learning, Sweden.
29. Sjøvold, E., & Hegstad, A.-C. (2008). Group dynamics, professional stereotypes and dominance: The performance of interdisciplinary teams in hospitals. In S. Jern & J. Näslund (Eds.), *Dynamics within and outside the lab: Proceedings from the 6th GRASP conference, Lund University, May 2008* (pp. 159–183). Lund University, Sweden: POST Network, Lund University.
30. Frost, H.D & Regehr, G. (2013). "I AM a Doctor": Negotiating the Discourses of Standardization and Diversity in Professional Identity Construction. *Academic Medicine*, 88 (10): 1570–1577. doi:[1097/ACM.0b013e3182a34b05](https://doi.org/10.1097/ACM.0b013e3182a34b05)
31. Traynor, M. & Buus, N. (2016). Professional identity in nursing: UK students' explanations for poor standards of care. *Social Science and Medicine*, 166: 186–194. doi:[10.1016/j.socscimed.2016.08.024](https://doi.org/10.1016/j.socscimed.2016.08.024)
32. Bell, L., & Allain, L. (2011). Exploring professional stereotypes and learning for inter-professional practice. An example from UK qualifying social work education. *Social Work Education*, 30 (3): 266–280. doi:[1080/02615479.2010.483726](https://doi.org/10.1080/02615479.2010.483726)
33. Carpenter, J. (1995). Doctors and nurses: Stereotypes and stereotype change in interprofessional education. *Journal of Interprofessional Care*, 9 (2): 151–161. doi:[10.3109/13561829509047849](https://doi.org/10.3109/13561829509047849)

34. Pietroni, P. (1991). Stereotypes or archetypes? A study of perceptions amongst health-care students. *Journal of Social Work Practice*, 5 (1): 61–69. doi: 10.1080/02650539108413457
35. Azer, S. (2005). Challenges facing PBL tutors: 12 tips for successful group facilitation. *Medical Teacher*, 27 (8): 676–681. doi:1080/01421590500313001
36. Hammar Chiriac, E. (2010). Basgruppshandledning inom PBL på högskola och universitet [Tutorial group supervision within PBL at higher education and university]. In J. Näslund & M.-L. Östergren (Eds.), *Forskning och erfarenheter från olika verksamhetsområden* (pp. 109–115). Lund, Sweden: Studentlitteratur.
37. Dolmans, D., Wolfhagen, I., van der Vleuten, C., & Wijnen, W. (2001). *Solving problems with group work in problem-based learning: Hold on to the philosophy*. *Medical Education*, 35 (9): 884–889. doi:1046/j.1365-2923.2001.00915.x
38. Rosander, M. & Hammar Chiriac, E. (2016). The Purpose of Tutorial Groups: Social Influence and The Group as Means and Objective. *Psychology Learning & Teaching*, 15 (2): 155–167. doi:10.1177/1475725716643269
39. Ancona D., Bresman, H. (2007). *X-teams*. Boston, MA: HBR Press.
40. Edmondson, A. C. (2012). *Teaming*. San Francisco, CA: Jossey-Bass.
41. Healey, M.P., Vuori, T., Hodgkinson, G.P. (2015). When Teams Agree While Disagreeing: Reflexion and Reflection in Shared Cognition. *Academy of Management Review*, 40 (3): 399–422. doi:10.5465/amr.2013.0154
42. Pentland, A. (2014). *Social Physics*. New York: Penguin Books.
43. Sjøvold, E. (2007). Systematizing Person-Group Relations (SPGR): A Field Theory of Social Interaction. *Small Group Research*, 38, (5): 615-635. doi:10.1177/1046496407304334
44. Sjøvold, E. (2014). *Resultater gjennom team*. [Results through teams]. Oslo, Norway: Universitetsforlaget.
45. Björnstjerna Hjelm, A. (2017). Inte så stereotyp som man kan tro. Om interprofessionellt sammansatta basgruppers utveckling vid problembaserat lärande. [Not as stereotype as one can believe -About interprofessional composite base groups development in problem-based learning]. [Master's thesis]. Linköping: Linköping University
46. Hammar Chiriac, E., & Einarsson, C. (2018). *Teori och praktik* (tredje upplagan) [Group observations. Theory and practice, 3rd edition]. Lund, Sweden: Studentlitteratur.
47. Sjøvold, E. (2006). *Teamet: Utvikling, effektivitet og endring i gruppe*. [Team: Development, efficiency and change in groups]. Oslo, Norway: Universitetsforlaget.
48. Sjøvold, E. (2002). *SPGR manual*. Oslo, Norway: SPGRpublishing Books.
49. Sjøvold E., & Andre B. (2020). *Interprofessional stereotypes in physician and nurse education in Norway* (work in progress)
50. Braithwaite, J., Clay-Williams, R., Vecellio, E., Marks, D., Hooper, T., Westbrook, M., & Ludlow, K. (2016). The basis of clinical tribalism, hierarchy and stereotyping: a laboratory-controlled teamwork

experiment. *BMJ Open* 6 (7): doi:10.1136/bmjopen-2016-012467

51. Mercer, N. (2008). The seeds of time: Why classroom dialogue needs a temporal analysis. *Journal of the Learning Sciences*, 17 (1): 33–59. doi:10.1080/10508400701793182

52. British Psychological Society. (2014). *Code of human research ethics*. Retrieved from <https://www.bps.org.uk/news-and-policy/bps-code-human-research-ethics-2nd-edition-2014>

Figures

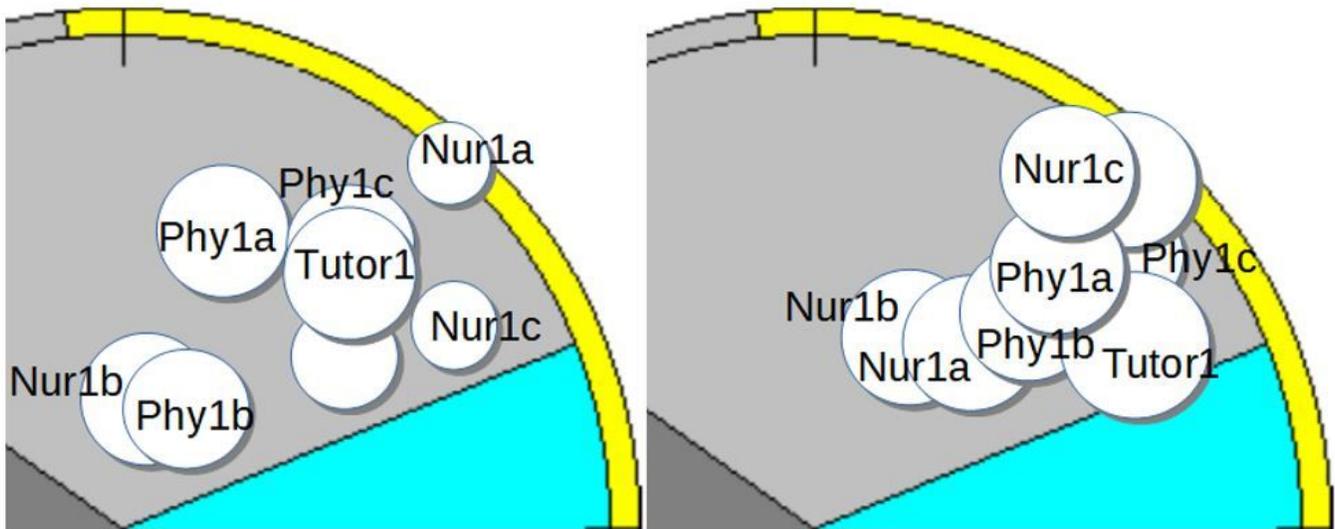


Figure 1

a, b Tutor group 1. Each circle represents one group-member. The left diagram (1a) is from the start of the six-week period and the right (1b) from the end. The circle labelled Phy... represent physicians and Nur... nurses. In the right diagram the circles are closer together, indicating that this group became more cohesive over the six-week period. Distribution of influence, illustrated by circle size, also became more equal among team-members as seen in the right diagram.

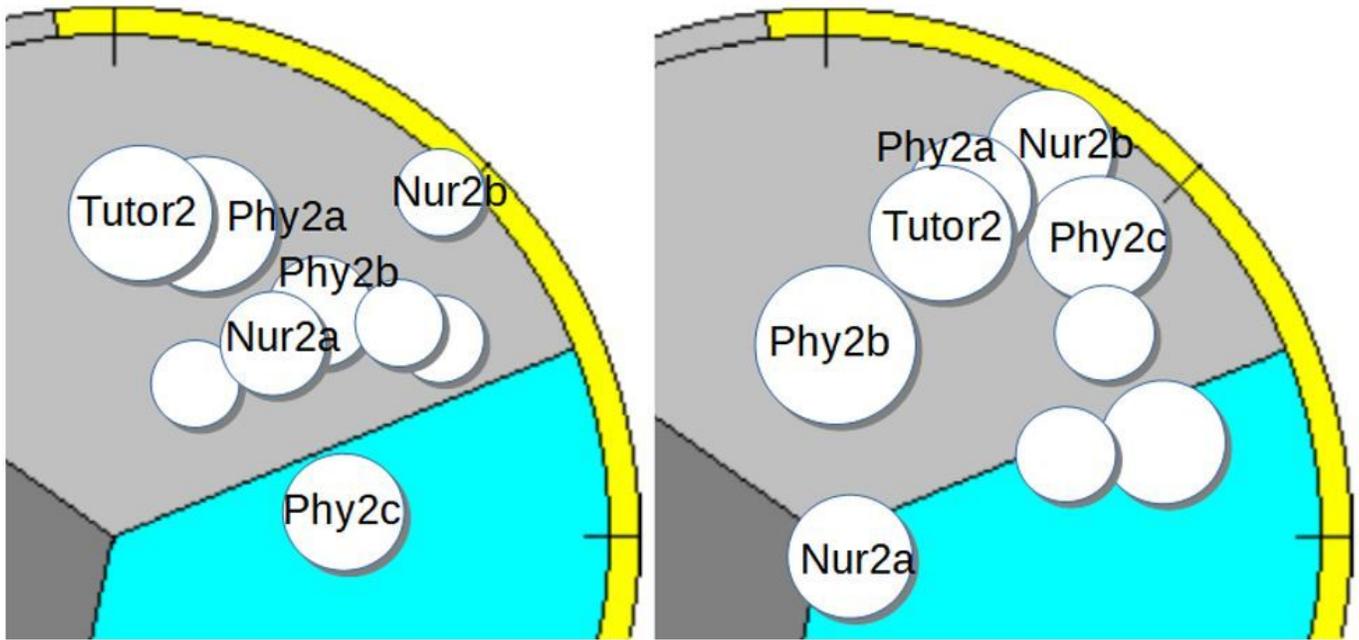


Figure 2

a, b Tutor group 2. This group was fragmented at the start with a dominating tutor and became even more fragmented at the end of the six-week period (right diagram).

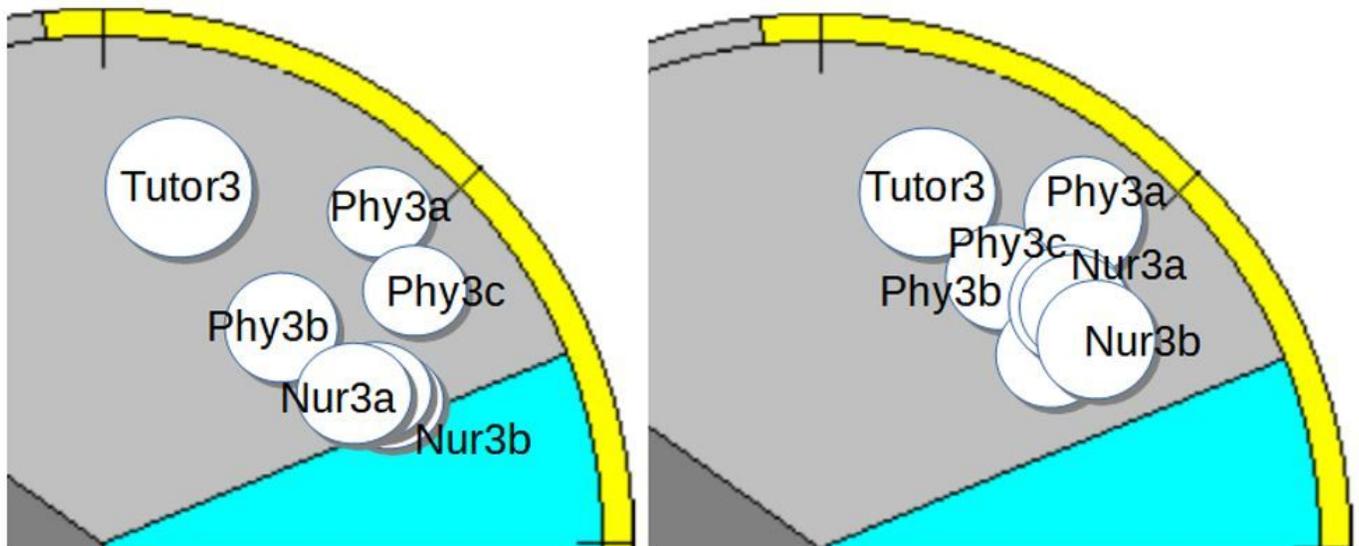


Figure 3

a, b Tutor group 3. As group 1, this group became more cohesive over the period. The tutor show dominating and authoritarian behavior like the tutor of group 2. Also, for this group distribution of influence (circle size), became more equal among team-members (right diagram).

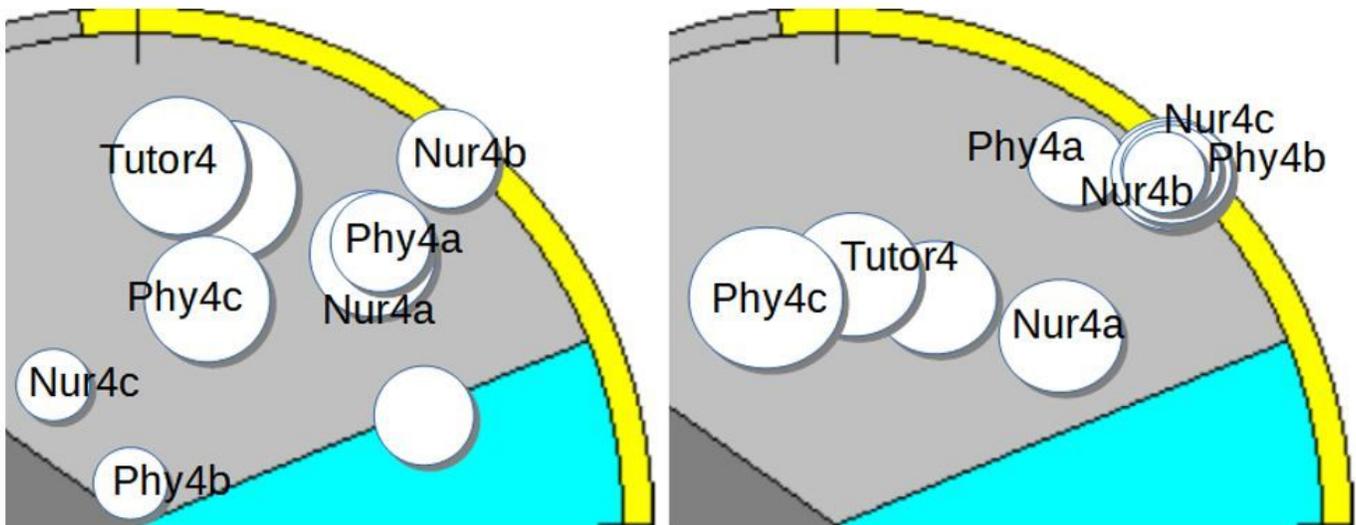


Figure 4

a, b Tutor group 4. Group 4 started out as a fragmented group with an authoritarian and dominating tutor (left) and ended as a polarized group (right) with two subgroups; one with members Phy4c, Tutor and one other member, and one with members Phy4a, Phy4b, Nur4b and two others. Nur4a is partly outside the first sub-group and may act as a mediating role in the polarization.