Socialization, Professional Identity Formation and Training for Uncertainty: Comparison of Student- and Clinician-Lead Problem Based Learning Groups in the First Year of Medical Education

*Stefan Reinsch, Juliane Walther, Stefanie Oess,
Wiebke Tschorr, Jonathan Nübel, Jannis Schwanemann, Can Gero Leineweber**

ABSTRACT

Clinical knowledge, group facilitation skills, and cognitive congruence are considered important factors for the successful tutoring of Problem Based Learning sessions. In addition, the theory of Community of Practice has become an important tool to approach social learning and knowledge integration in medical education and organizational studies. More research is needed to link these two strands of research. We look at novice medical students' experiences and comparative reflections on student-tutors and clinician-tutors as facilitators of PBL sessions in a participatory, randomized cross-over design. Qualitative methodologies were

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*   Stefan Reinsch, Centre for Curriculum Development and Educational Research – ZSAW-BB , Centre for Health Service Research – ZVF-BB, Brandenburg Medical School & Faculty of Health Sciences Brandenburg, Germany
Email: stefan.reinsch@mhb-fontane.de
Juliane Walther, Centre for Curriculum Development and Educational Research – ZSAW-BB, Brandenburg Medical School & Faculty of Health Sciences Brandenburg, Germany
Email: juliane.walther@mhb-fontane.de
Stefanie Oess, Centre for Curriculum Development and Educational Research – ZSAW-BB, Brandenburg Medical School & Faculty of Health Sciences Brandenburg, Germany
Email: stefanie.oess@mhb-fontane.de
Wiebke Tschorr, Centre for Curriculum Development and Educational Research – ZSAW-BB, Brandenburg Medical School, Germany
Email: wiebke.tschorr@mhb-fontane.de
Jonathan Nübel, Centre for Curriculum Development and Educational Research – ZSAW-BB
& Department of Cardiology, Immanuel Klinikum Bernau, Heart Center Brandenburg, Brandenburg Medical School, Germany
Email: jonathan.nuebel@immanuelalbertinen.de
Jannis Schwanemann°, Centre for Curriculum Development and Educational Research – ZSAW-BB, Brandenburg Medical School, Germany
Email: jannis.schwanemann@mhb-fontane.de
Can Gero Leineweber°, Centre for Curriculum Development and Educational Research – ZSAW-BB, Brandenburg Medical School, Germany
Email: can.leineweber@mhb-fontane.de
°JS & CGL share the authorship

used to probe the experiences of participants. In this study, the main factor for successful PBL sessions for first-year students was the creation of a non-hierarchical learning atmosphere, which starkly differentiated itself from the rigidity of a PBL structure organized around clinician-tutors and their hierarchically-imparted knowledge. In contrast, a more flexible strategy of student tutors and their constructive management of "not-knowing" enabled novice students to take steps on their own — of which they were highly appreciative, stressing how it allowed them to develop earlier autonomy with regard to PBL methodology, manage uncertainty, and create a shared identity as a community of learners.

INTRODUCTION

Sociologist R.K. Merton has been a pioneer in pointing out the dual nature of medical education, the aims of which are to provide those wishing to become physicians the opportunity to acquire the best available knowledge and skills necessary for the practice of medicine and to support them to develop a professional identity, so that they may come to think, act, and feel like a physician (Merton 1957:7). Medical educators (Parboosingh 2002, Cruess *et al*. 2014; Cruess, Cruess & Steinert 2018) have recently taken up this view of learning, practice, and professional identity formation as inseparable. Professional identity is formed mostly through implicit experiences made at the side of role models as part of a hidden curriculum of rules, regulations and routines, much of which is transmitted by near peers - rather than faculty - in informal teaching situations (Stern & Papadakis 2006). One of these teaching situations is Problem Based Learning (PBL), where the development of team-oriented attitudes like cooperation and responsibility as well as skills in dealing with uncertainty in knowledge is one of the primary goals (Davis & Harden 1999).

Today, Problem Based Learning (PBL) is understood as a valuable tool linking medical knowledge to practice (Barrows 1996). However, the most beneficial qualifications and backgrounds of those facilitating the PBL sessions has not been addressed in a satisfactory fashion. Over the years, research has looked at the characteristics of PBL tutors mainly in terms of two factors: first, the differential influence between content expert and non-content expert tutors, and second, the effectiveness of staff versus student tutors. In medicine, PBL sessions are usually centered around clinical cases. Therefore, content experts are individuals possessing clinical expertise in a given subject or clinical discipline, which can be gained by direct exposure to clinical practice, such as working for years as a physician. In addition, process expertise, the didactic skills and ability to

facilitate group sessions, is considered a separate set of skills important for the successful facilitation of PBL sessions (Dolmans et al 2002).

Regarding academic achievement and student satisfaction, the literature, excepting some studies that are mildly in favor of content expertise over group facilitation skill, is inconclusive (Davis et al 1992; Schmidt et al 1993; Hendry 2002; Gilkison 2003). Research into the relative effectiveness of staff versus student tutors is equally difficult to adjudicate (Moust et al 1989; Moust & Schmidt 1995). Overall, the empirical literature remains unsettled regarding the preferred background for the PBL tutors. Notwithstanding this lack of empirical basis most authors suggest a combination of content and process expertise and cognitive congruence, which is the ability to think like students, and to empathize with their circumstances (Schmidt & Moust 1995; Maudsley 1999; Dolmans et al 2002; Ten Cate et al 2012). However, in most of the studies cited above the students' perspective of what defines a "successful PBL session" is missing (Dolmans et al 2002). Only recently have students been involved in their own curricula as "partners", the focus being less on academic achievement, but to increase the accountability of their curricular decisions, enhance their engagement and responsibility for learning, and strengthen their professional-identity formation (Bilodeau, Liu & Cummings 2019; Zhen & Wang 2022).

At the newly founded Brandenburg Medical School – Theodor Fontane a medical curriculum was established in 2014 in several rural hospitals situated in the state of Brandenburg situated in Eastern Germany. Basic science and clinical elements are taught alongside each other, with basic science making up about 80% of the learning objectives during the first year and clinical learning objectives about 20%. This balance is gradually reversed as students progress through the years. During the first five of a total of six years, PBL is the central curricular element, driving the identification of learning objectives in relation to the clinical case. During a two-hour PBL session, a complex and authentic medical problem is presented at the beginning of each week. PBL small groups define leaning objectives in relation to the case and to the themes of the related disciplinary modules (e.g. The learning objective "Explain, why the RS virus impairs breathing of toddlers more than in adolescents" would relate to pathophysiology of breathing, basic science of gas exchange, and pediatrics). The learning objectives can be approached while studying alone, during seminars, lectures or tutorials. At the end of the week, the group presents its findings to each other and discusses and reflects on the results of learning and occasionally tries to solve the problem during a second two-hour session. Complexity of the clinical cases increases over the course of medical studies and also includes social and ethical aspects. There are no examinations of the PBL learning objectives, which are meant to serve the students' self-directed learning process. However, the PBL cases are related to the overall learning objective of the semester. These objectives are transparent

to the students and form the basis of end-of-semester exams. Good PBL learning objectives would stimulate students' curiosity and be in line with what the faculty expects them to learn over the semester. The PBL process also requires collaboration, critical thinking and practical learning that are part of a hidden curriculum. Participation in 85% of the PBL sessions is the only requirement to be eligible for exams.

In line with the literature on PBL, tutors at our medical school are instructed to act like moderators or facilitators. The aim of the tutor is to help students to arrive at a deeper understanding and develop skills that can be deployed in other domains, rather than merely learning facts. Tutors' roles in PBL differ from other formats like lectures or tutorials. The most relevant skills here are to activate students, supervise the quality of learning, give learning aids, and serve as role models when dealing with problems (Maudsley 1999; Mayo, Donelly & Schwartz 1995; De Grave, Dolmans & van der Vleuten 1999).

When establishing or extending PBL curricular, faculties are often confronted with the task of training many tutors that have no clinical background (Vogt, Pelz & Stoux 2017). PBL tutors in our medical school were mostly clinicians working at one of the medical departments and have been trained in a standardized ten-hour didactic course. Only a minority of clinicians had experienced PBL as students. In 2020, the growing student number required to recruit non-clinical staff such as psychologists, pharmacists or paramedical professionals, as well as some student tutors to fill gaps in the teaching staff. This raised the question of whether the practical experience of senior students could be used to teach PBL to their novice (peer)students: the rationale being that students had accumulated experience in over 100 PBL sessions.

We were unsure, however, if and how this participatory experience could be translated into tutorial expertise. From our perspective, this does not only require content expertise, facilitation skills and cognitive congruence. It also involves the "putting on of a new cloak" as facilitator. Student-tutors, while studying and acting as PBL facilitators, build up a reflective experience (Rolfe 1997) that is subsequently transformed into expertise (Beck 2015). This process is continually reproduced within each generation of teachers and students in the specific community of practice in university medicine.

We approach the question of expertise development and professional identity formation with a focus on social practices (Schatzki, Knorr-Cetina & Sawicki 2001). Practices are understood, broadly, as a set of sayings, doings and organizational ways, abiding by ways of understanding and a set of rules and teleo-affective structures, or aims (Schatzki 2001: 61). The identity of a person (teacher or learner) is conceptualized as a function of relations—and conversely, relations are functions of identity (ibid: 51). This is important, as it allows us to look beyond fixed social roles (student, physician, teacher, patient, …)

and to foreground the relational nature of identity and practices. People perform acts of learning, organizing, deciding, writing-up clinical cases, telling stories, etc. and through these performances they work on identifying as students, tutors or clinicians. Processes of identification are shaped by the practices people perform and the relations with other people that arise within these practices.

Within the field of practice theory and organizational studies of medicine and beyond, the concept of community of practice (CoP) has become an important tool to approach social learning and knowledge integration. A broad definition of a CoP is "a group of people who share a concern for something they do and learn how to do it better as they interact regularly" (Wenger, 1998). The shared learning process creates a bond among the members over time. Originally, it was developed to understand adult learning in apprenticeships e.g., midwifery (Lave, 1991). Today, CoP use has been extended from learning within to learning across disciplinary communities in science, businesses, and medicine (Regeer & Bunders, 2003; Amin & Roberts, 2008; Manidis & Scheeres, 2013; Cundill, Roux & Parker, 2015; Cruess, Cruess & Steinert, 2018). A key concept of CoP theory is, that one becomes a member of a community by acquiring the skills and knowledge of that community; with this, one moves from legitimate peripheral participation to a more central position, transforming oneself, as well as the group (Lave & Wenger, 1991).

The first year of medical education seems crucially important as it is often the first encounter with the set of norms and values central to the CoP of medicine. In our medical school, the longest lasting and most engaged interactions between novice students and experienced members of the CoP of medicine occur during PBL. We hypothesized that these interactions would take different forms depending on whether the group is led by student-tutors or clinical tutors. We wanted to explore if these different interactions would in turn influence the way the small groups of novice students approach the central tasks of PBL: how they interact as a group, and how they deal with not-knowing and the uncertainty of what was known.

MATERIAL AND METHODS

Study Design

The initiative for our study came from a group of students at our medical school who felt PBL could be improved by making use of senior student's experiences. The first author, together with the vice-dean of education of our University (SO) and a group of senior students (CGL, JS, WT & JN) developed a participatory design to conduct and evaluate a randomized, cross-over comparison of physicians and students as PBL-tutors during the first year of medical education. In the academic year 2020/2021, the forty-eight first-year students were randomized into six PBL groups of eight students. Half of the PBL groups

were facilitated by a student-tutor during the first semester; the other half were tutored by a physician. After one semester, student groups were switched (Figure 1). The student-tutors remained involved in all steps of the research, presented findings on conferences and co-authored this publication.
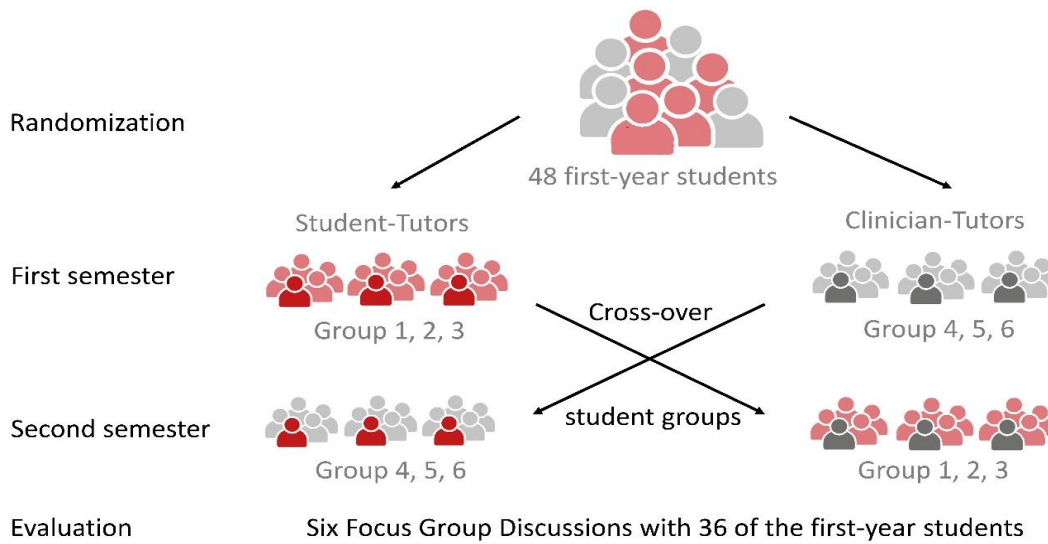

Figure 1: Flowchart of Study Design.

Student population

Post-hoc analysis showed that the student groups were comparable regarding age, gender, A-Level results and previous experience of working or studying (Table 1). Minor differences in age and previous experiences between groups were non-significant. Two students left before the end of first year of medical school and were not included in the analysis.

PBL Group		1-3 (n=24)	4-6 (n=22)	Total (n=46)
Demography	Age	$25,95 \pm 4,69$	$23,5 \pm 2,78$	$24,78 \pm 3,9$
	Male	8 (33,3%)	6 (27,3%)	14 (30,4 %)
	Female	16 (66,7%)	16 (72,7%)	32 (69,6 %)
	A-level results	$2,3 \pm 0,51$	$2,2 \pm 0,5$	$2,23 \pm 0,5$
Previous Experiences	Paramedical	13 (54,2%)	9 (40,9%)	22 (47,8%)
	Nursing	6 (25%)	3 (13,6%)	9 (19,6%)
	EMS	3 (12,5%)	4 (18,2%)	7 (15,2%)
	Midwifery	2 (8,33%)	-	2 (4,35%)
	Various	2 (8,33%)	2 (9,09%)	4 (8,7%)

Non-medical	2 (8,33%)	2 (9,09%)	4 (8,7%)
None	9 (37,5%)	11 (50%)	20 (43,5%)

Table 1. Demographics and Previous Experiences of First-Year Students

Tutors

Ten student-tutors volunteered to participate in the study. All of them had previous experience studying or working before their medical studies. Six had didactic experience teaching practical classes at the local skills lab. Four tutors were involved in designing and evaluation of the study. Tutors were studying in the 6th to 10th semester, resulting in 3-5 years of first-hand experience with the PBL format and methodology. However, student-tutors lacked certain content-based and case-related expertise, which the physicians had developed in real-world clinical scenarios. Clinician-tutors had not undergone PBL themselves. They represented a range of experiences: from resident to attending physician to professor and Head of the Clinic. At the start of the study, student-tutors and physicians were trained through the same standardized 10-hour didactic course. During the study, two group-feedback sessions for tutors and two individual supervisions during PBL were offered to all tutors. However, only the student-tutors made use of this offer.

Evaluation

We used qualitative methods, namely participant observation, interviews and focus groups to explore interactions, experiences, and views of participants. Here, we report on the results of the focus groups. Five individual interviews with students-tutors were held before the start of the first semester. They served to explore potential problems and construct the interview-guide for the focus groups.

Six focus group interviews with the first-year students were held after the completion of the second semester. We chose to conduct the focus groups in the same composition of students as the PBL groups. This allowed discussions about shared experiences among the group members. Focus groups were conducted by SR and CGL. Focus groups lasted 60 minutes on average. Thirty-six first-year students, representing 75% of the cohort, participated in the focus groups. Non-participation was due to drop-out from medical school (n=2) or problems in scheduling a time slot (n=10). Focus groups centered on the students' experiences during the first year of PBL. We used open-ended questions and encouraged participants to elaborate and discuss with the group members. We specifically asked for comparative perspectives on working with the different tutors, how this affected group dynamics, the identification of learning objectives, the motivation to study, and if students preferred one or the other tutoring style during the first year. The interview guide for the focus groups is appended.

Interviews and focus groups were audio-taped, transcribed verbatim and pseudonymized following transcription. In addition, we wrote field notes directly after the interviews in order to maintain contextual detail.

SR and JW read all transcripts and analyzed the transcripts both independently and in joint analysis sessions. In these sessions, they developed the themes and selected the quotes which are discussed in this paper. During the process of analysis of the focus groups, identity formation and socialization were identified as useful concepts linking the practice of PBL sessions with their aim. Two analytical concepts *knowledge-* vs. *process-centeredness* and *community of learners* vs. *hierarchy of knowers* were inductively developed from the material. To validate findings, we discussed them first with the student-tutors and subsequently presented our findings to the University's students in a workshops, as well as to the University's working group for curricular development.

Research Ethics
The study was approved by the University's ethics committee. All students and tutors were informed about the research at the start of the study. Non-participation in the study was not possible as PBL is the central curricular element. Participation in the interviews and focus groups were voluntarily, and participants received written information and gave their oral and written consent.

RESULTS

Socialization, Professional Identity Formation and Training for Uncertainty
We shall first look at how the students perceived their tutor's strategies in terms of teleo-affective structure i.e., what was aimed for. Clinical tutors' strategies were perceived as centered on the acquisition of knowledge, while those of the student tutors' were centered on developing the group-process. The clinician-tutor's central position in the CoP of medicine in itself had a powerful inhibitory effect on novice students' ability to speak freely and openly about not-knowing. This was different with the student tutors who were seen as being on an equal footing with the novices. Second, we will contend that position and strategy of the tutors had an additive effect on novice students' identification, as either a *community of learners* or a *hierarchy of knowers*. Third, we argue that the two different group organizations and the values that underlie their respective identifications have repercussions on dealing with uncertainty.

Student-tutors' strategies are group-process centered, clinician-tutors' strategies are knowledge-centered
During all Focus Group (FG) discussions, students reflected on the different ways their tutors adhered to or modified the rules of the PBL classroom. Clinical tutors dominated the PBL process, leaving students little flexibility with the methodology. As a result,

students' attention to the group process moved in the background, and PBL was centered mainly on the acquisition of factual knowledge. The student tutors focused less on knowledge and more on developing the group process. They allowed their students greater degrees of freedom in interpreting the PBL process. Their strategies were described as more flexible and adaptive and as not anticipating or forestalling students' own learning process.

> I had the feeling that during the first semester, PBL [with the student tutors] was a bit more open [...] We were somehow freer in our decision-making process. [Focus Group 2, lines 13-17]

> We had found our way in the structure [of PBL] and developed a structure of our own [during the first semester]. This may not have been easy, but then [the clinical tutor during the second semester] said, 'Yes, but I don't want it like that, I want this in a different way, I want that in this or that order. If you did it otherwise, I don't care, but now I say it must be like this. [FG 2, l. 233-40]

> During the first semester [with the student tutors], PBL was not only about acquiring knowledge, but also about working together and getting along as a group—about this, too, being of importance. [FG2, 90-92]

> Especially these anticipating clinical experiences that have been 'inserted' by clinicians have partially taken away the freedom. [FG6, 40-2]

In our FG discussions, students understood the different strategies employed by clinicians and student-tutors as related to their respective differential positions within the community of practice of medicine. Because the clinical tutors were perceived to hold a more central position within the CoP, they had a powerful inhibitory influence on the students who were reluctant to speak freely, fearing to leave a negative impression. The more central the clinician-tutor's position, the stronger the effect. The potential role of their clinician tutors as examiners in upcoming exams added to this inhibitory effect, since students feared their contributions during PBL would influence their grades negatively. The perceived inhibitory effect was not noted with the student-tutors. All the student-tutors were seen as being "on par" (*German "auf Augenhöhe"*):

> We've, of course, also had [the clinic's chief who was the groups PBL tutor] during practical tutorials and a bit of the fear therein is: will he be my examiner later? [FG5, 530-1].

> I believe there was a higher inhibition threshold among us to participate in technical discussions, because one knew that the Head of the Clinic was also listening. [FG1, 165-6]

> Simply because [student tutors] were fellow students from a higher semester, it made no big difference in the end [if we impressed them]. I found, we were equals. [FG2, 37-40]

In the first section we demonstrated the effect of tutoring style and the tutor's position within the CoP. In the next section we argue that these have an additive effect. The tutors' strategies in group facilitation and the respective positions of the tutors within the CoP of medicine, informed by these strategies, reinforced each other. We argue that this dynamic leads to the development of two distinct identifications – a *community of learners* of students and student-tutors and a *hierarchy of knowers* organized around the clinical tutor.

Two distinct Identifications develop: a "Community of Learners" vs. a "Hierarchy of Knowers"

First-year students noted that they reacted to the different strategies by adjusting the group dynamics depending on the tutor's position in the CoP. All groups reflected how they aspired to receive the accolade of the clinical tutor. If praise was offered, students felt a reinforcement of their progress towards the clinician's position. The clinician's strategy to intervene in the group process by providing clinical knowledge was matched by the students. They noted that they, too, started to act more knowledge-centered, offering as much information as possible, irrespective of whether this would help the group. Such a reinforcement or an active change of behavior was not noted with the student-tutors' praise. Because of their social, emotional and cognitive congruence, these tutors were seen as part of the group, despite their formal role as group leaders:

> Receiving praise from the Chief or the attending physicians during the second semester for being so structured in our work, this was of course a positive reflection of the training that we got during the first semester. [FG1, 227-9]

> With the clinicians we noticed that some [students] felt obliged to provide knowledge, of some kind, that may or may not have been relevant in that context.

> Reacting directly to the above statement, a student added: Personally, I perceived it like that, too – one noticed when one or the other was courting the clinician's favor, which was not the case with the PBL student-tutors. Because, whether I impressed them or not was of no importance in the end. [FG2, 57-64]

> Well, they were there – an integral part of the group somehow. It's not like they were this extra leader, just simply they were there, in the PBL group. […] Yes, officially they were probably PBL group leaders, but it's not like… well, they were just integral to the group. [FG2, 227-242].

The three PBL groups that had been initially taught by student-tutors noted a shift in group structure and identification following the transition to having clinical tutors. This switch they described as an erosion or dissolution of the already established *community of learners.* They noticed the development in the process, but were unable to preclude it. In retrospect, the groups reflected that clinical tutors were seen as members of a group, to which the students would want to belong in a 5–6-year long-term perspective. The gap between first-year student and experienced clinician was perceived as leading students to abandon an already established set of shared interests in favor of the interests of the clinician. In one of the strongest-worded statements, a group of students from the second FG reflected on how their group's focus during PBL moved away from them as a group of peers, and sometimes even away from their own learning process, leading to a situation, in the end, where the clinical tutor would become the vanishing point for each member of the group, with everyone adjusting their behavior accordingly:

> I believe that these hierarchies – the gap vis-a-vis the clinician tutor, was simply so huge that, really, our group interests shifted, with everyone then becoming a lone fighter. [FG2, 160-64]

> We were having a discussion and suddenly, contributions would come in whereby one had the feeling that they were not directed at the group at all, or aiming to further the brainstorming, but rather: 'I want to show here, in front of whoever is watching, that I have learned something – throw around some technical terms and create a favorable impression.' And they somehow fed off each other [these people showing off] in a mutual reinforcement such that one felt the person was no longer reachable. [FG2, 168-73]

> Now that there was a certified physician at the helm, it was no longer a communication amongst peers, there reigned this tendency… hierarchy, pure and simple, that was not there before. Somehow one wanted now to please a figure of authority, talk up to them and for their sake, implementing things that were not in our interest just because some superior had dictated them. [FG2, 118-26]

Training for Uncertainty in the "Community of Learners" and the "Hierarchy of Knowers"

In the third section we elaborate on the question of how the two different group organizations and the values that underlie their respective identifications have repercussions on dealing with uncertainty. A central tenet of PBL is to learn to identify knowledge lacunae that could then serve as a motivator to fill-in these gaps, and as a guidance to direct collective learning. Thus ideally, collective learning during PBL reqires an open dialogue about what is known and what is unknown to the group and to the community of practice of medicine. The task of differentiating between these two,

sociologist of medical education Renée Fox has termed "Training for Uncertainty" (1957).

Students drew their conclusions about the identification of their tutors mainly from how the latter dealt with knowing and not-knowing. Student-tutors dealt constructively with their own not-knowing, pointing out its important role in learning. Novice students very much appreciated this attitude They learned from the tutors' example that what counts as right or wrong does not depend on a person's position in a hierarchy. Herein manifests the aspect of identification which is seen as central by novice students: their shared identity as continuous learners. In one FG discussion, students referred to a situation where PBL cases unintentionally contained mistakes. These provided an opportunity for students to witness different approaches of student and clinician tutors in dealing with the uncertainty of knowledge and the revelation that knowledge, proffered by authority (the University) may be false:

> I simply discovered during the second semester [student tutored], unlike it was in the first, that the University could be fallible, too; [that PBL cases could contain mistakes and so] that more or less everything, outside the student [realm] be allowed to be fallible. [FG3, 158-60]

> I found it very refreshing that the student tutors either said, 'I believe it to be so-and-so, but do not take it from me – it was really long ago and I can't remember.' Or, 'let's talk about it the next meeting [and make it a learning objective].' [FG2, 253-261]

> We are all students, and we are all still studying. None of us has any official document hanging on the wall that certifies we have already gone through this. [FG1, 457-8]

In contrast, the clinical tutors' self-conception was seen as containing the pretense of knowing everything. Sometimes, knowledge appeared made-up or misleading:

> With the clinician tutors there was always a pretense: 'I am now a certified physician. I cannot say now that I do not know this.' [FG2, 253-4]

> [Clinician tutors gave the impression] 'I have to know this now and I have to say something even though I might not know it all that exactly either.' [FG2, 474-5]

> And then, from the farthest corner of their mind, they would sometimes fetch some scrap of information. Situations would arise fairly often were information was thrown at us that turned out to be false in the end. [FG2, 253-261]

The first-year students connected a clinician's socialization to the pretense of knowing-it-all. However, students underscored that the onus of this expectation toward the physicians did not emanate from the students:

> Of course, if your studies lie some 20 or 30 years back, then you do not know everything razor sharp. But I also think that physicians were brought up to always have an answer, to simply pretend to know exactly. [FG2, 610-20]

> But actually, I don't feel like we have pushed them into this role of having to never make mistakes, of having to be *know-it-all* and *almighty* [English in the original]. Yes. [FG2, 636-7]

In retrospect, all focus groups agreed that they would have preferred student tutors during the first semester, but valued that they had been able to compare between different tutoring styles.

DISCUSSION

We started from the position that learning, practice and professional identity formation in medicine are inseparable. Our basic assumption for the study was that student-tutors would be able to transform the experiences made during their studies and reflexively translate these experiences into expertise in PBL facilitation.

We found that, depending on whether a group was tutored by a *near peer* or a more senior, clinical member of the CoP, the novice students reported differences in the perceived aims underlying the styles of the tutors. In our data, these differences showed repercussions along three main axes. First, they impacted the aspect of group-process vs knowledge-centeredness of the PBL sessions and the students' satisfaction with the PBL sessions. Second, the values and identification of the PBL group were affected, and third, there were repercussions as to how the groups dealt with *not-knowing* and with uncertainty when trying to adjudicate between personal ignorance and unsettled puzzles in the field.

First, we found that student-tutors' strategies were more group-process centered, while clinician-tutors' strategies were more knowledge-centered. Novice students linked these strategies to the tutors' respective positions within the CoP. Within the CoP of medicine, student-tutors occupy an intermediate place in the successive progressions from non-student to medical student to experienced physician. In the words of Merton, students-tutors build an identity as student-physicians while still learning to practice medicine. In line with findings from Schmidt and Moust (1995), we found that this was a position that

allowed them to develop greater cognitive congruence with novice students than experienced clinicians would have. From the novice students' perspective, this group-process centered approach translated into more satisfying PBL group facilitation at the beginning of medical studies.

Second, over the course of the first year of medical school, the students who participated in our study became acquainted with and learned to differentiate between the different PBL tutoring styles. Our results showed that these different styles affected group dynamics and lead to identifications either as belonging to a *hierarchy of knowers* organized around the knowledge of a senior member of the CoP or as belonging to a *community of learners* collectively striving to attain the best available knowledge. The contrasting experiences they made with the student- and clinician tutors allowed students to reflect, i.e. to contrast and compare in the anthropological sense. It is our opinion that in the process of reflecting the values and norms inherent in the different tutoring styles in the PBL environment, novice students undergo a process of professional identity formation.

Third, we were surprised, about the dynamics of learning to manage uncertainty that unfolded in relation to the different tutoring styles. It stands to reason that novice students might feel closer to student-tutors than to clinicians, as the latter are seen as more "establishment", hence further away within the CoP of medicine. Student-tutors are in an intermediate position between novice students and clinicians. They are still studying, but already part of the teaching staff. They embody both the core values of the university and the way forward as student-physicians. In our study, student-tutors were reported to have dealt more constructively with their own not-knowing than clinicians had. Novice students learned from the tutors' example: namely, that what counts as right or wrong does not depend on a person's position within the pecking order. Herein manifests the aspect of identification perceived as central by novice students: their shared identity as continuous learners. Be it as positive or negative role models, clinicians provided a helpful foil for students to contrast and compare styles and values.

One of the strengths of our study, our reporting on the student's experiences and views, also entails a potential confounder. We saw that the people more central in the hierarchy most strongly influenced the group dynamic. We cannot exclude the possibility that participants of the focus groups were also influenced by the interviewer. We attempted to minimize this effect in the following ways: firstly, we were open about the study being jointly led by members of the faculty, clinicians and students. Secondly, the focus groups were jointly held by a clinician and a student-tutor and the two intervened as little as possible in the discussions.

In medical education, student tutors are usually employed in skills labs or as teaching assistants for basic science classes. Such Peer Assisted Learning Programs are chiefly established for practical purposes. According to the literature, the lack of resources to adequately serve a growing student population and the search for cost-efficient ways of teaching are common driving factors. When classes and exams show high rates of failure, such programs may be the ancillary option of choice and it also helps to address blind spots in the curriculum (Herrmann-Werner 2017). Our study tried to test whether student tutors could be of benefit beyond serving as Band-Aids for lacking resources or in the detection of curricular blind spots. Our results show that the purposeful deployment of PBL student-tutors is beneficial for first-year students. The first semesters are potentially most formative in terms of socialization within the CoP. In line with findings from Zheng & Wang (2022), the student-tutors of our study who had personal experience with the PBL format and the local curriculum were able to create situations such that novice student could develop their own, sovereign and autonomous ways of dealing with the affordances of PBL. The student-tutor's constructive example in dealing with personal *not-knowing* and with the uncertainties in differentiating between *personal not-knowing* and the *not-knowing of the CoP* was praised by novices. The underlying values of cooperation and critical thinking helped the novice students to identify as a *community of learners.*

Looking at stakeholders beyond the first-year students, we see clear benefits for the tutors and the institution. Acting as PBL tutors provides the students involved with the opportunity to develop important skills and competencies in professional and scholarly domains in accordance with the CanMEDS model (CanMEDS 2000). We will report our findings from the interviews with our tutors in a subsequent publication.

As a result of our study, the University decided to implement a policy of using PBL student-tutors in the first year. We believe this to be a pathway worthy of further exploration within the bounds of our institution. Our contention is that the student-tutors' embodied memories from similar PBL learning situations create a collectively embodied memory culture. It is this culture promoting a propitious atmosphere that students described as a *community of learners.* It guides the novice students as they navigate medical studies; thus helping in the constitution of new experiences and preparing the ground for lifelong learning.

Looking at the future of PBL beyond medicine, we feel that the idea we tested in our study is well worth embracing by other institutions as well, so that the first and most formative interactions may happen in the company of near peers, such as student tutors, rather than under the auspices of the people most at the center of the CoP. PBL is a highly interactive learning format that has the potential to transform that CoP. The embodied-knowledge of prior generations is re-generated within the contexts of novices'

interactions within the social and material environment of the PBL classroom. If these interactions are more cooperative and less hierarchical, so might become the CoP over time. To borrow a phrase from anthropologist Harris (2005:198), the collective experience of a CoP acts like "a wave which carries forward the history of past actions and embodies their potential".

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