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SOCIAL CONSTRUCTION OF KNOWLEDGE IN FUTURE TEACHERS IN PROBLEM-BASED LEARNING TEAMS

Jurgita Lenkauskaitė
Šiauliai University, Lithuania

Abstract. *The transformation in teacher training today is a widely analysed issue in the field of higher education. The search for educational strategies allowing to develop competences important to a future teacher, to be constantly learning, to be able to collaborate in a team, to analyse and solve authentic problems, to construct one's knowledge is gaining bigger and bigger relevance. It has been noticed that problem-based learning is one of attractive strategies responding to many challenges that higher education studies of today are facing.*
The aim of the present research is to reveal the opportunities and experiences of social construction of knowledge in future teachers in problem-based learning teams.
The problem question is how do future teachers socially construct knowledge in problem-based learning teams?
The methods of the analysis of scientific literature and interview have been used. Using the method of the analysis of scientific literature, the importance of social construction of knowledge in teacher training and opportunities for activity of future teachers in terms of knowledge construction in problem-based learning teams have been revealed. Interview with future teachers has highlighted students' various experiences in problem-based learning teams. There future teachers were learning to critically evaluate their own and their colleagues' ideas from various aspects. The development of the abilities to analyse and solve authentic problem-based situations the teachers will face in future every day has been emphasized. The dynamics of teamwork manifesting itself in problem-based learning has allowed future teachers to reflect on the progress of their knowing how to learn and share.
Keywords: *future teachers, problem-based learning, social construction of knowledge.*

Introduction

Future teachers' teaching and learning have recently been raising numerous discussions among both the theorists and practitioners of the science of education. Teachers trained using conventional approaches have been observed to experience considerable challenges in application of innovations in their work after completion of the degree. One of today's students' key competences is collaborative problem-solving (Pisa 2015 Collaborative Problem-Solving Framework, 2017). This competence should be emphasized as early as the period of training of future teachers in order to educate the students capable of

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demonstrating this competence. In light of changing roles of teachers, information transfer to students has been pushed to the background by the competence of creating appropriate conditions for team-work, being considerate of each member's particular aspects, and constructing knowledge at the same time, the role of which has been growing lately.

Social construction of knowledge is often related to the science of sociology (Berger & Luckmann, 1966). Nonetheless, it has been gradually gaining importance in education as well. In the context of learning paradigm, the emphasis has been placed on learners' active approach, which is inherent to their initiative of self-construction of knowledge. Training of future teachers is the most successful, where the students become involved in a certain situation by analysing it and constructing its meanings at the same time. University didactics has changed since the constructivist approach asserting that knowledge is constructed in the process of human interaction with the world has become mainstream (Gordon, 2009).

In view of the constructivist principles, training of future teachers should focus more on analysis of the authentic educational context. Students become the subjects who actively construct knowledge, rather than mere objects taking in the information transferred. These and similar priorities of the university didactics are emphasized by problem-based learning – one of the educational strategies which has found increasingly wider application in terms of university studies. Originating from medical studies (Barrows & Tamblyn), this approach has been widely analysed in teacher training context as well (Baysal, 2017; Barron & Wells, 2013).

Future teachers studying under the problem-based learning approach analyse and deal with authentic teaching and learning issues they are to address during their actual professional activity. Specifics of the teacher's profession implies than a teacher faces unexpected situations almost all the time and should be prepared to find a working solution. Another important aspect of teacher's activity is the ability to work in a collaborating team. This is yet another key elements of problem-based learning, for authentic issues are multi-dimensional and urge for an integrated approach, which can be provided only by a team comprised of different individuals joining their efforts.

Research object – future teachers' social construction of knowledge in problem-based learning teams.

The aim of the research is to reveal the opportunities and experiences of social construction of knowledge in future teachers in problem-based learning teams.

The methods of the analysis of scientific literature and interview with future teachers.

Future teachers' social construction of knowledge

Teacher's competences are inseparable from communication and collaboration skills, team mobilisation (Švietimo ir ugdymo studijų krypčių grupės aprašas, 2015). University training of teachers that would be prepared for professional practice full of challenges requires providing conditions for them to analyse and deal with authentic problems in collaborating teams, actualising own experience, enriching it by building on the colleagues' experience, thus engaging in social construction of knowledge.

University didactics is closely related to the theories behind the teaching and learning process. Constructivism is currently one of the most frequently referred to theories underlying education (Krahenbuhl, 2016). Despite its different varieties, it essentially emphasizes the idea that knowledge is constructed in the process of interaction with the world (Gordon, 2009). When building on the constructivist principles in future teachers' learning, their active approach, advocating own ideas, sharing the knowledge held, and creation of new knowledge, thereby addressing authentic problems emerging in teacher's professional activity, become important.

Knowledge is traditionally associated with revelation of a truth existing on a certain objective basis. The advocates of constructivism, however, emphasize the idea that there is no knowledge beyond an individual (Gordon, 2009). Absolutist approach towards individual knowledge could also be recognized as being limited. Under the individualist epistemology (the theory of cognition), conveying as much knowledge as possible to an individual and expanding his thinking abilities are the most important. The theory and practice of education have been centred on an individual and his/her cognition as an individual process for a long time. Such an approach is questionable as it demonstrates only one side of the opportunity for learning, limited by a single individual's knowledge and understanding, leading to isolation or competition rather than promoting collaboration (see Foucault, 1975).

The idea of a subject of active cognition, as emphasized by the constructivist theory, implies the education practices enabling learners to actively participate in the social environment, thereby constructing knowledge, rather than listen to the teacher while remaining in a passive position. S. Brinkmann & L. Tanggaard (2010) have referred to the theory of cognition that is based on pragmatic constructivism and emphasizes learners' active engagement by employing the metaphor of "epistemology of the hand". The metaphor emphasizes that learners have the possibilities to be active and act in a constructive way, "using own hands" in the process of their studies.

In the practice of education, it is important to note that social construction of knowledge can be used as a model alternative to individualist epistemology.

Authors supporting the idea of social construction of knowledge (Berger & Luckmann, 1966; Gergen, 1999) emphasize that knowledge is a product of not only individual cognitive, but also social process. Every learner lives in a certain socio-cultural context, his/her living world acts on his/her knowledge. This validates the importance of sharing knowledge and social construction of its new meanings.

Social construction of knowledge may cause a number of challenges to the process of learning by future teachers. These, however, are the challenges that should be overcome before one engages in teacher's professional practice. Learners supporting the idea of individualist epistemology, showing tendency towards collection and demonstration rather than sharing of knowledge may find this particularly challenging. One of the educational strategies closely related to social construction of knowledge is problem-based learning. In problem-based learning, considerable focus is placed on the learners' team work, provoking the processes of social construction of knowledge.

Future teachers' activity in problem-based learning teams

Majority of the authors emphasize that problem-based learning is the method that helps avoid limitations of traditional teaching and learning, train students capable of engaging successfully in practice (Blackbourn et al., 2011). Problem-based learning enables future teachers to acquire currently relevant competences, such as collaborative problem solving in teams. It is also important that future teachers acquire these competences in view of their professional activity in order to be able to successfully mobilise student teams for cooperation, motivate the teams properly for solution of authentic problems, and social construction of knowledge.

Team work is an inseparable part of problem-based learning (Azer, 2008). It usually takes place throughout the learning process in parallel to individual work. The team mobilises for the first discussion as soon as it is presented with (or the team identifies by themselves) an authentic problem situation requiring analysis and different approaches and not having a single clear solution. Team members define each other's roles and assign the questions to be addressed by self-study. Team members meet on a regular basis for sharing the knowledge accumulated by each member and holding joint discussion on the problem addressed. If they succeed, the team work may become a great strategy for the future teachers to perform social construction of knowledge, deal with the problems to be encountered in their future practice.

In the team work, tutor's function of the facilitator implies students' activity being their responsibility. It should be noted, however, that the process may become uncontrollable, when certain students do not perform the tasks

delegated to them with due responsibility. This may harm both the team atmosphere and the expected outcome. It is very important that future teachers receive facilitator's adequate assistance in their team work and are provided with proper conditions for development of their team work skills, acquisition of the required knowledge on the team development dynamics. Mere subject-related knowledge directed towards problem solving is not sufficient for future teachers' social construction of knowledge.

Knowledge sharing and construction are the most successful in the teams comprised of students holding different experience and different approaches. The differences in their experience become even more evident as they actively study different sources, perform different roles in the team, collaborate with different people who are able to provide valuable input into analysis of the problem addressed. It is not only the cognitive, but also emotional aspect that becomes an important prerequisite for social construction of knowledge in a problem-based learning team. During discussions on solution of authentic problems, learners become even more involved into the study processes and subjects dealt with, the problems become relevant to them personally, and a solution that is better thought through and applicable to real life is adopted.

By working in teams, future teachers acquire a lot of important competences, develop the principles that are important for social construction of knowledge. Following their empirical research works focusing on future teachers who studied under the problem-based learning approach, R. Murray-Harvey et al. (2013) have identified their collaborative learning. This kind of learning manifests itself in such principles as openness to other people's views, recognition of a contrasting opinion and perspective, demonstration of humility in view of the common goal. Strong emphasis is also placed on the abilities which have become evident in problem-based learning team work, for example, positive sharing and collaboration, working as a group for finding a solution to a problem, critical thinking in solving a problem, sharing roles and responsibilities, dealing with conflicts, etc. In construction of new knowledge, different ideas and concepts are analysed, theory is linked to real life. Problem-based learning enables future teachers to learn a lot about team dynamics, understand how to form groups, include all learners into joint work, etc.

Research methodology

Problem-based learning has been practiced at Šiauliai University since 2012, starting with implementation of project *Upgrading of Study Programmes by Introduction of the Problem-Based Learning Method*. Several study programmes were upgraded on the institutional level, and certain teachers have been practicing problem-based learning in their study subjects until present. The

article analyses the study results generated by student (future teacher) interview surveys conducted in January 2018 upon completion of the course that predominantly applied problem-based learning as the method of teaching and learning.

A problem related to preventive teaching has proposed to students under the course framework. By socially constructing knowledge, future pedagogues attempted to find the technique of preventive activity, which would help prevent problems that usually emerge among pupils. By working in teams, students identified the main problem, identified the attractive form – film watching – for pupils, developed an engaging teaching aid for the film analysis in line with the topic of pedagogical prevention. Future teachers worked as a team, but split the questions among themselves, and each member acted as an expert in a certain area and presented the respective material accumulated by them to the team during the meetings for further joint analysis of the problem and development of the final product. The tutor acted as a facilitator who helped the students, where appropriate, thus promoting their learning process by means of brief consultation.

During analysis of the scientific literature, communication with the students working under the problem-based learning method, the team work has been noticed to raise a number of different challenges. Nonetheless, it offers considerable benefit as well. In view of the importance of collaboration for the future teachers, they were asked to reflect on their experiences gained during work in the problem-based learning teams in the end of the course.

Analysis of future teachers' experiences in problem-based learning teams

Future teachers who worked in problem-based learning teams identified a great deal of experience related to social construction of knowledge and thinking progress. Their answers grouped into categories and sub-categories have been illustrated with the statements and presented in Table 1.

Future teachers note that collaborative culture is developed in problem-based learning teams. Other authors have also drawn attention to expression of collaborator's learning in problem-based learning teams (e.g., R. Murray-Harvey et al., 2013). In the study conducted, a variety of statements characterising collaborative culture in the course of social construction of knowledge have been identified. Future teachers noted the diversity of insights, experiences that has become evident in the team. The informants have referred to this diversity as a positive aspect that promotes tolerance, search for compromise, listening to each other. Mutual help in the team and favourable conditions to learn from each other have been noticed.

Table 1 **Future teachers' experience of knowledge construction in problem-based learning teams**

Category	Sub-category	Illustrative statements
Experience of knowledge construction	Collaboration culture	To listen to each other carefully
		To tolerate others' opinions, work methods
		To learn from each other
		To look for a compromise
		To share insights, experience
		To observe how we can assist each other
		To split duties
		To have the sense of responsibility for own work and team
		To provide proposals without harming warm working climate in the group
		To generate ideas, turn them into shared output
		The roles assumed become evident during the work: generator of ideas, executor, critic, etc.
		We are interested in encouraging others; unfortunately, we sometimes fail
		Encouragement, praise by the team members help very much
	Expression of critical, creative thinking	To look at own thoughts, knowledge critically
		To better learn about oneself and other person
		A lot can be seen through other people's eyes, from different perspectives
		Better work can be achieved in a team, while individual work produces poorer results, not exceeding one's capacities
		Enables creative thinking

The study has revealed that each member of the problem-based learning team assumes certain role, thus complementing others. Splitting duties enables integrating own contribution into joint effort. Construction of knowledge in a team also emphasizes the importance of both individual and team work; however, team interests should be treated as more important than the personal ones. The informants emphasize the responsibility for the both areas of activity. Nonetheless, the priority of team work becomes evident, as individual ideas are generated with the aim to contribute to the joint goal, without affecting positive team micro-climate.

The students are interested in success of their team, and not only put more own effort, but are also inclined to encourage others. Good result can be achieved by work of a problem-based learning team only if everyone works together, as authentic problems demand multi-dimensional consideration of a

solution. Several informants have noted that they are positively influenced by encouragement from other informants. However, there also are those who have faced the cases, where motivation of other team members sometimes fails. Hence, future teachers face the situation where people with different motivation operate in a team, and ways for promotion of their motivation need to be found.

It has been noted in the scientific literature that activity in problem-based learning teams promotes development of higher-order thinking (Raiyn & Tilchin, 2015). During the study, emphasis on creative and critical thinking has become particularly evident. New knowledge is constructed not only in view of the problem analysed, but also in view of oneself as well as others. Other people's perspective shows multi-dimensionality of views, enables critical assessment of own knowledge and ideas. The multi-dimensionality of views in a team allows to avoid limitations created by one person's capacities when addressing and solving a problem.

During the study, the students revealed that, in the course of social construction of knowledge in teams, they developed positive principles in terms of team work, leant certain roles important for teaching practice (Table 2).

Table 2 **Teachers' roles learnt in teams**

Category	Sub-category	Illustrative statements
Teachers' role	Teacher – team facilitator	It is important that a teacher considers the persons comprising the team
		It is best to teach/learn social skills in a team
		We learnt by observation of the work and making input where necessary
	Teacher – learner	Team work is encountered in professional practice, and it is important to learn it
		Team work is very important in a learning process
	Teacher – leader	It is important to empower the team for active performance
		To defend own opinion
		To notice other person's strong sides and make use of them
	Teacher – problem solver	I learn to overcome difficulties in various situations
		I think what to do for the team to perform better

By working in a team, future pedagogues – in terms of meta-learning – gain competences in team mobilisation, develop positive view towards team work by emphasizing that it helps develop social skills. The students encounter a variety of different experiences and opinions, and reflect on this experience by stating that it is important to account for all the team members, maintain control over the team work, but, at the same time, make sure that conditions for work

under own techniques and at own pace are provided, while assistance is provided only if necessary. Hence, the future teachers note the ways to facilitate the learners' team for it to develop in an appropriate direction and for natural learning process to take place.

Teachers' main practice covers work with different people, collaboration. Preparation for such practice can start as early as during the degree studies, when the students are provided with the conditions to learn by working in a team, thus gaining knowledge about the team itself, its development, and realising the benefit provided by team work.

Teachers' leadership is a recently topical subject, discussed by emphasizing that, educational leadership of school principals is being replaced by shared leadership of all teachers, which is manifested in assumption of responsibility, empowerment of other people for activity, advocating of own opinion in the search for a compromise, etc. (Mokytojų lyderystė ir jos sąsajos su švietimo kokybe, 2015). Students note teacher's practice as of a leader, emphasize learners' cognition and identification of their strengths in the team work.

Problem analysis and solving is one of the key aspects of problem-based learning. Future teachers learn by solving problems that are similar to those they are to encounter in their professional practice. The students have also noted that the problem-based learning process itself, and, in particular, team work become a considerable challenge that is to be addressed. Hence, in the course of problem-based learning, students construct their knowledge not only in view of the problem addressed, but also in view of the team work, its principles and possibilities for improvement, which is particularly relevant for the future teachers who intend to apply this learning strategy in their professional practice.

Conclusions

One of the recently most frequently referred to theories underlying education is constructivism. Social construction of knowledge that emphasizes active approach to learners' cognition is closely related to constructivism. In the process of future teachers' learning, social construction of knowledge is recognized as a more appropriate alternative compared to the individualist epistemology. The latter is limited by human experience and view. Social construction of knowledge enables enriching one person's experience emerging from his/her living world with another person's unique experience, thus constructing new knowledge.

The process of social construction of knowledge manifests itself actively in student problem-based learning teams. At this point, they develop their experience by collaborating with each other, analyse and address authentic problems pertaining to their profession together. It is important that future

teachers gain as much diverse experience by themselves in team work as possible in order to later be able to succeed in becoming assistants to teams of their pupils.

During the study, future teachers were found to place considerable focus on collaborative culture during social construction of knowledge in problem-based learning teams. Collaborative culture manifests itself in listening to each other, search for a compromise, tolerance of otherness, sharing insights, assisting and encouraging each other for the sake of shared output. In the course of team work, future teachers expand and update their knowledge related not only to the problem analysed, but also to themselves and other team members. By being in a team, students learn to perform different roles, develop higher-order thinking, in particular, critical and creative thinking.

Future teachers have noted that participation in problem-based learning teams has enabled them to try out the roles that are important for their future professional practice. Diversity of teacher's roles has been revealed: teacher is the facilitator of the learners' team, continuously learning himself/herself, capable of demonstrating leadership skills, reflecting on and addressing problems (both pertaining to the area analysed and arising in the team activity).

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