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# PEDAGOGICAL FOUNDATIONS OF DEVELOPING STUDENTS' COLLABORATIVE SKILLS BASED ON A MULTI-VECTOR APPROACH

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## ABOUT ARTICLE

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**Abstract:** In the current time of globalization, collaboration among people in virtual environments is becoming an important precondition of success. This trend is reflected also in the educational domain where students collaborate in various short-term groups created repetitively but changing in each round (e.g. in MOOCs). Students in this kind of dynamic groups quite often encounter various difficulties, which are obvious mainly when the students' characteristics do not complement each other. In spite of various group formation methods aimed to solve the group compatibility problem, most of the existing approaches do not consider dynamic groups. Our results indicate that considering feedback from students' collaboration can improve the group formation process as the groups created by our method achieved higher collaboration quality with next iterations.

## INTRODUCTION

In the recent years, collaboration among people became an integral and essential part of the web. Users collaborate and communicate in different kinds of communities and groups across different domains. This trend is present also in educational systems where collaboration is commonly employed not only to share and learn new knowledge but also to develop students' soft skills (e.g. communication skills, self-reflection and self-regulation). Especially, the research area of Computer-Supported Collaborative Learning (CSCL) studies how to effectively link together fast advance in computer science with collaborative learning in small groups [1]. The rising popularity of web-based learning systems caused that many students with different characteristics, skills and aims are supposed to collaborate on common tasks. From one point of view, this diversity has a beneficial effect on creative and successful collaboration. On the other hand, personal differences do not have to be compatible with each other and consequently students' collaboration is not very successful in many cases.

## METHODS

There exist several methods which solve a group formation problem in the educational domain. The significant part of these methods focuses on long-term groups which collaborate on complex tasks during several days or even weeks. Another part of existing methods is aimed to propose short-term groups but they usually consider only a single assignment of students into groups ignoring following collaboration.

The main subject of our research are dynamic groups in which members collaborate on short-term tasks and students are repetitively assigned to groups whose composition differs in each round. This kind of dynamic groups appears especially in online learning systems, in which students learn self-controlled and are not mutually synchronized, such as in Massive Open Online Courses (MOOCs), where:

1. Only limited information about students is available.
2. Rules for successful group creation are unknown or change significantly in time.
3. Groups need to be created ad-hoc and in real time while considering student's actual context and online presence.

## RESULTS AND DISCUSSION

All these limitations cause that existing approaches are not very suitable to create dynamic groups. Therefore, the main contribution of this paper is a proposal of a novel method for dynamic (iterative) formation of small short-term and virtual study groups which is supposed to perform bet- ter under the given conditions. The proposed method is

fundamentally based on its iterative application and on feedback provided by the evaluation of collaboration achieved in the created groups. Following analysis of the existing group formation methods and the requirements of educational context (i.e. collaborative solving of short tasks that exercise primarily new topics), we decided to base the design of our method on the Group Technology approach.

Any such method cannot exist without its application in a real collaborative environment. For this reason, we paid attention to the design and implementation of the collabo- rative environment too. We introduce a collaborative plat- form named PopCorm that serves two purposes: 1) as an example how to implement the approach within a learning environment, and 2) as a tool to be used for the method's validation. We are aware of a gap between fast growing collaboration software and its real application in the field of CSCL [3]. PopCorm represents an innovative learning environment with a set of real-time collaboration

tools. These tools are based on the latest web technologies and represent an important source of automatically collected feedback to the proposed group formation method.

GROUP DEVELOPMENT IN ONLINE ENVIRONMENT

The basic concept of CSCL is collaboration which takes place in more or less explicitly defined groups. This collab- oration is not performed in one consistent phase. Actually, groups are creating, developing and finally closing. This process can be described as a lifecycle of small groups. Groups' effectiveness and successfulness depends on dif- ferent circumstances during entire groups' lifecycle [4].

Tuckman's model has been already successfully applied to localized long-term study groups (e.g. [3]) but it is not very suitable for groups in online environments which we are interested in. The main reason is that the purpose of stages storming and norming is to build up strong relationships and a common collaboration plan. However, while these attributes play an important role in long-term groups, distributed groups (e.g. those created in various MOOCs) involve students with more loosely tied relations as well as dynamic groups usually do not solve tasks that require a complex planning. Nevertheless, Tuckman's model becomes the base for many other specialized groups' lifecycle models. One of them is group development model proposed by Daradoumis et al. [4], [5], which was proposed especially for needs of collaborative learning and working in virtual long-term groups.

The main focus of our research is, however, to support short-term virtual groups. These groups exist only for a very short time (usually less than one hour) and thus their lifecycle is simplified in comparison with long-term groups. The phase of productive performing follows immediately after finishing the group formation process. After achieving the group's goal, the short phase of group closing can appear (see Figure 1).

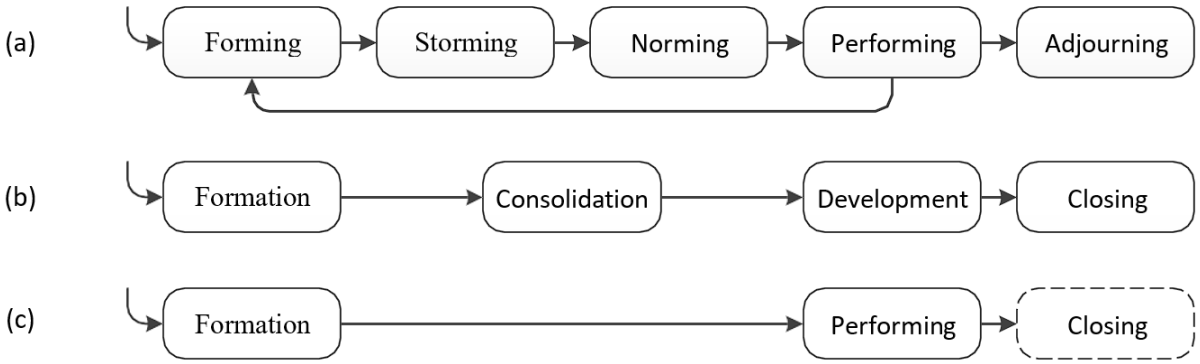


**Fig. 1. Comparison of small group development models: (a) the referential Tuckman's model of long-term localized groups [6]; (b) model of long- term virtual groups proposed by Daradoumis**

Group Formation

The main goal of the first stage of group development is to solve a problem how to assign students to groups. The traditional approaches to solve this problem are to select students randomly, let students group by themselves or group them manually by a teacher [2]. These approaches, however, have quite substantial disadvantages.

Randomly selected groups can be highly unbalanced what can likely lead to an ineffective composition of groups. Moreover, the random selection ignores any suggestions what a successful group should look like.

The second possibility is to shift the responsibility for group creation to students. Some researches indicate serious problems when the group formation process was managed by students themselves (e.g. [3]). Students tend to create homogenous groups on the basis of existing social relationships or their knowledge level (i.e. good student with other good ones). This trend prevents spreading of knowledge and ideas between students in new social communities. Another problem can be caused by minority students. If they are isolated in groups, this isolation can contribute to more intensive feeling of loneliness which can finally cause their inactivity. Daradoumis et al. [4] in their experiment conclude that 21 out of 138 students in total were not able to find and join any group. By evaluation of questionnaires at the end of the experiment, authors identified the source of this problem. The students did not realize the importance of the group formation process or they became involved in this process very lately.

Finally, a teacher can manually assigns students into groups according to information known about students. A teacher can approach this task intuitively and join together those students whose combination he or she believes can lead to active collaboration. This kind of manual group formation can be very difficult and time-consuming [4], especially for a big amount of students or in a case when a teacher does not know students well. In addition, the complexity of this approach increases when we create heterogeneous or mixed groups where the count of all possible group assignments can be really high [1].

In order to create better study groups, automatic computer-supported methods are proposed. Employing computer support in the group creation process can lead to several important advantages. Especially, it is possible to consider a large amount of information even from very different sources. In addition, group creation can be performed very fast and anytime on demand by students or a learning system itself. Last but not least, computer support allows to create anonymous groups in which members do not know their identity.

**According to students' involvement**. Some methods involve students' participation in the group formation process (e.g. [3]). Students are asked to specify their personal characteristics (e.g. interests or self-evaluated level of knowledge) or preferences (e.g. group or task preferences). Consequently, group formation methods can take advantage of these students' inputs and propose more suitable groups. On the other hand, this approach has several notable disadvantages, such as students may not wish to spend an additional time with filling questionnaires (especially in the case of short-term collaboration). In addition, self-evaluated characteristics can be significantly skewed due to a natural trait of subjective rating.

Another option is that the group formation process can be performed without any active participation of students. In this case, the group formation process usually consists of three steps: initiating a group formation process by a teacher or a learning environment, identifying peer learners who fulfill requirements for participating in the group and negotiating with potential participants [4]. All three steps can be supported by adaptive educational systems.

**According to formation frequency**. Nonrecurring methods for group formation produce a single assignment of students into groups and thus, these methods usually do not consider their following development.

As opposite to this approach, iterative methods suppose that group formation will repeat in several following rounds and, therefore, they can take into consideration feedback from the previous students' assignments.

## CONCLUSION

We have successfully applied the proposed method in the collaborative platform PopCorm which provides students with the appropriate environment for effective communication and collaboration. It was also used as a tool to evaluate the proposed method during an experiment with 110 students. The results of the experiment show that the study groups created by the proposed method achieved the higher collaboration quality in comparison with the reference groups.

We identified many possibilities how to improve current design of the proposed method and its application in collaborative learning. We have not focused on task assignments to created groups in our work. It provides promising possibility how to further improve learners' collaboration because each group has different characteristics and different tasks are suitable in a particular moment of collaboration.

## REFERENCES


1. G. Stahl, T. Koschmann, and D. Suthers, "Computer-supported collaborative learning: An historical perspective," in Cambridge handbook of the learning sciences, 2016, pp. 409–426.
2. J. Vassileva, "Toward social learning environments," IEEE Transactions on Learning Technologies, vol. 1, no. 4, pp. 199–214, 2018.
3. C. Safran, D. Helic, and C. Gütl, "E-Learning practices and Web 2.0," in Proc. of the Int. Conf. of Interactive Computer Aided Learning, 2017, vol. 1, no. 1, pp. 1–9.
4. T. Daradoumis, M. Guitert, F. Gimenez, J. M. Marques, and T. Lloret, "Supporting the composition of effective virtual groups for collaborative learning," in Proc. of Int. Conf. on Computers in Education, 2022, vol. 1, pp. 332–336.
5. Мусурмонов, Р., & Мусурмонова, М. (2020). Таълимда инновацион фаолият давр талаби. Science and Education, 1(Special Issue 4), 223-231.
6. . Мусурманова, О., Палуанова, Х., Рискулова, К., & Курбаниязова, З. (2019). Педагогик атамалар луғати: ўзбек, рус, инглиз тилларида. Т.:"TURON_IQBOL.
7. Musurmanova, A., Jumaniyozova, M. T., Isaqulova, N. J., & Jumaev, A. (2018). General Pedagogy.