7. The Quest for the Holy Grail of Effective Collaborative Learning

How to Turn Group Work into a Learning Situation

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Collaborative learning for students and professionals

Think back to the last time you learned something new. There is a good chance that the situation in which you learned this was during a discussion with friends, working with colleagues or going out with family members. In another situation you may have learned something individually, which you discussed or shared with other people later on and thereby contributed to their learning. What we learn and teach to others contributes and influences who we are.

Professionals often learn in similar ways to private individuals. Contemporary professional development programmes do not solely focus on taking formal courses to help employees stay up to date in their area of expertise; more and more initiatives regarding learning communities and professional networks have been formed to support professional development. In higher education, collaborative learning is implemented on a regular basis in curricula to contribute to higher learning outcomes. The outcomes of collaborative learning in educational settings are described as contributing to deep learning, motivation, shared knowledge construction, the development of higher order thinking skills, metacognitive skills and prosocial behaviour (De Hei, 2016). Furthermore, collaborative learning can prepare students for learning and working in teams in their future work. It also can be an initiation for the professional development of students.

Despite this favourable description, these possible outcomes are not always attained. In some groups participants may stimulate and support one another, work hard, and harmonise their efforts to contribute to the group process with the efforts of other participants. In other groups, participants may not get along, they may not perform a behaviour that leads to effective collaboration, and maybe even appear to be doing as little as possible. With my research I aim to contribute to insights into how we can implement collaborative learning in such a way that it is effective and worthwhile for the participants.

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The design of collaborative learning for students

For my PhD I did four studies. The results of my first study (De Hei, Strijbos, Sjoer, & Admiraal, 2015) show that teachers in higher education consider the design of collaborative learning to be a complicated task. Frequently mentioned obstacles in attaining the learning goals were: problems with free-riding students, task division amongst students instead of in-depth interaction about learning content, and problems in how to assess the group work.
In order to find a way to support my fellow teachers with these difficulties, I reviewed scientific articles on group learning activities (GLAs). This resulted in a comprehensive framework that can be used by teachers as a tool to design collaborative learning (De Hei, Strijbos, Sjoer, & Admiraal, 2016). Eight components for the design of GLAs were extracted from literature: 1) interaction, 2) learning objectives and outcomes, 3)

Step 1 Analyse	**Determine fixed characteristics**: Student characteristics, Teachers' characteristics, Curriculum characteristics, Collaborative premise, Global goals		
Step 2 Design	**Interaction** *(declarative and procedural (domain) knowledge, social and metacognitive activities)*	**Learning objectives and outcomes** *(goal setting, content of learning)*	**Assessment** *(means, criteria)*
Step 3a Develop (didactics)	**Task characteristics** *(Kind of activities, phases/sequencing, duration/frequency of group meetings, performance control)*	**Structuring** *(A priori, during GLA, reflection and evaluation)*	**Guidance** *(executor, teachers' role, communication mode, duration and timing)*
Step 3b Develop (logistics)	**Group constellation** *(number of groups and group size, heterogeneous or homogeneous, group duration)*	**Facilities** (*learning resources, technology resources, space and time)*	
Step 4 Implement	Monitoring the instructional process		
Step 5 Evaluate	Evaluating the processes and outcomes		

Figure 1. The GLAID framework (De Hei, Strijbos, Sjoer, & Admiraal, 2016).*

assessment, 4) task characteristics, 5) structuring the collaboration, 6) guidance, 7) group constellation, and 8) facilities. In Figure 1 you can find these components inserted in a design tool, the GLAID (group learning activities instructional design) framework.

Alignment

As you can see in the framework there is more to the design than just these eight components. Before starting to design group work, you first need to think of what is already there that cannot be influenced (step 1, analyse), such as the characteristics of the participants. For example, you need to know how much prior experience the participants have in collaborative learning, or what prior knowledge the participants have regarding the subject the group will be working on. You need to align the components of the design with these fixed characteristics. For example, if the participants are freshmen who have little experience in working in projects, you may choose to clearly structure the collaboration by assigning roles to the participants. The components themselves also need to be aligned. Alignment of the components means that every decision taken in one component is related to decisions in all the other components.

An example of alignment between learning objectives and outcomes, assessment and group constellation is when one of the learning goals of the project is to relate knowledge about 'psychology of the adolescent' to 'social media use'. An appropriate assessment task then could be for students to research hot topics in social media and explain these hot topics using aspects of adolescent psychology. If a learning goal for students is to take different perspectives towards a topic, heterogenic groups are most suitable to attain this learning goal.

During the period that students work on the group assignment, the components and their alignment need to be monitored (step 4) to make necessary adjustments during the course, and to evaluate the design when the group assignment is completed (step 5).

Design procedure

There are two ways to design your project or group assignment with the GLAID frame work: start from scratch, or start with an existing design in order to improve it.

When starting from scratch, I suggest that after establishing the fixed characteristics as in step 1 (such as the characteristics of the participating students, the teachers who are assigned to the task of guiding the GLA and the global goals), simultaneously design the components as in step 2 (interaction, learning objectives and outcomes, and assessment), considering the fixed characteristics of the learning environment of step 1. Next, again simultaneously, develop the didactics as in step 3a (task characteristics, structuring and guidance) and align them. Check whether your design is in line with step 2 and step 1. Finally, develop the logistics as in step 3b (group constellation and facilities), and again check whether this is aligned with the decisions taken in the earlier steps.

In the case of an existing project that you may wish to improve, I suggest starting with the component you regard as significant for this project or assignment. After reformulating the description, align the components from the same step with this description. Next, align components from the other steps with the redesigned ones. The last step is to check whether your decisions in all of the steps are congruent and aligned with the fixed characteristics of the learning environment, leading to a harmonious design of the project or group assignment.

Individual versus group learning
You may have the impression that I regard collaborative learning as the only, or by far most important, way of learning for students and professionals because of my arguments on the importance of collaborative learning. If so, please let me correct this misunderstanding. Individual learning and didactics aimed at the learning of individual students will, in my opinion, always play a significant role in students' and professionals' development. The extent to which this individual learning contributes to one's development will differ amongst individuals. In step 1 of the GLAID framework you can see that as a designer of group work, you need to take into account the 'collaborative premise'. Dennen and Hoadley (2013) state:

> The collaborative premise is the very reason for engaging students in a collaborative process and should be made clear to the learners who need to know why they are supposed to collaborate. The premise should clearly express what might emerge from their collaborative work, why their interdependence will be an important part of their learning process or their personal incentive structures, in describing in what ways they will be interdependent and how the very act of collaboration relates to the learning goals. If these things cannot be articulated to the learners than the collaborative promise is likely to be weak. (pp. 393)

In other words: if an assignment can be done equally well by working individually, then students should not be forced to work together. There needs to be a stringent urge to work and learn together. If this is not the case, then I strongly advise teachers to have students work on the task individually.

Teacher educators and the GLAID framework
After the development of the GLAID framework, I wanted to find out how the framework relates to the practice of educational designers. To this end, I interviewed teacher educators as experts on educational design (De Hei, Sjoer, Strijbos, & Admiraal, 2016). They were asked to describe their design practices without seeing the GLAID framework. It turned out that in their descriptions all eight components of the framework were touched upon. However, the facilities component was only mentioned

by some teacher educators. I am convinced that it is important to include this facilities component in the design of GLAs, because — no matter how well a GLA is designed — without the necessary space, time, technology, and support, students will not be able to attain the learning objectives of a GLA. For example: at one of the teacher education institutes, I spoke to students who were working on a group assignment at the same time as completing a much larger group assignment. The smaller assignment therefore did not gather as much attention. Additionally, during this period the student schedule contained full days of lectures with no time for interaction on the assignment. All the (class) rooms were reserved for lectures and meetings, leaving no quiet place for students to come together to work on the assignment. Because of a lack of facilities (time and space) the assignment did not lead to the attained learning outcomes. This example stresses the importance of the alignment of the components: if all of the design is harmonious except for only one component, the learning outcomes will not be achieved.

Student perception of collaborative learning

As a next step in my search for effective collaborative learning, more than 300 students in teacher education completed a questionnaire about what was perceived to contribute to their learning outcomes during collaborative learning (De Hei, Admiraal, Sjoer, & Strijbos, 2017). Students stated that they learned more when they perceived the collaborative task as positive and appropriate in attaining the learning goals. The same went for guidance: the positively evaluated guidance of teachers lead to more positive evaluations of the learning outcomes by students. Students also regarded group constellation — whether the size of the group and the characteristics of the group members are appropriate to perform the task — as important to the extent to which they were able to achieve learning objectives.

Another important finding of this study showed that the extent of engagement for the task highly determines how much the students learn. In other words: the more attractive a task is to students, the higher the engagement and the learning outcomes. Research literature describes several methods to enhance student engagement. Complex, authentic, and demanding tasks trigger student engagement (Dillenbourg, 2002). To enlarge the chance of effective group work, a task in which teams can build adequate shared mental models should be formulated. Interpersonal trust is a condition under which this is effectuated (Fransen, Kirschner, & Erkens, 2011). Finally, those tasks that elicit students to perceive autonomy and competence in completion of the task also contribute to higher effectiveness of collaborative learning (Boekaerts, & Minnaert, 2006).

Implications

In summarizing the research on collaborative learning, the quest for the holy grail of effective collaborative learning has not yet ended. The use of the GLAID framework tool for the design of collaborative learning in higher education may contribute to better aligned designs and hereby contribute to more effective collaborative learning. The GLAID framework may help monitor, evaluate and redesign projects and group assignments. We know that the perception of the quality of the task, and the extent to which students feel engaged, influences the perception of students of how much they learn from a GLA. However, perceptions alone are only an indication of what is learned. A next step is to study exactly what those learning outcomes are. This leads to a more difficult question: how can we measure the learning outcomes?

Measuring 'real' learning outcomes
Although a variety of research underlines the large potential of collaboration for learning outcomes, the exact learning outcomes of team learning can only be partly foretold. During collaborative learning students could partly achieve the same or similar learning outcomes, but as each individual learning internalizes what is learned from the collaborative learning by his/her given prior experiences and knowledge, the learning outcomes of collaborative learning are probabilistic (Strijbos, 2011), and therefore attaining specific learning outcomes is likely but not guaranteed. If learning outcomes are different per individual and are probabilistic, how can we measure those learning outcomes?
Wenger, Trayner, & De Laat (2011) regard the outcomes of learning communities as value creations that have an individual outcome and a group outcome. This value creation induced by collaborative learning consists, for example, of changed behaviour in the working environment as well as the production of useful products or artefacts. Tillema (2006) also describes that communities of inquiry can lead to the design of conceptual artefacts: products that are useful for a professional working environment. However, the use of collaborative learning alone is no guarantee for the knowledge productivity of a team. This leads to two new research questions: 1) could the GLAID framework be used, in an adapted way, to contribute to designs for learning communities with the purpose of knowledge productivity that leads to the creation of artefacts, and 2) how can conceptual artefacts be validated as (learning) outcomes?

Concluding remark
Overseeing the new questions that arise from my research so far, I wonder whether I can still speak of a quest for the holy grail of effective collaborative learning. Maybe a future title for essays on my work should be: The Perpetuum Mobile of Research Questions Regarding Effective Collaborative Learning ☺.

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