Making online group-work work: Scripts, group awareness and facilitation

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Abstract

Even though group work for learning is a well-established and extensively researched pedagogy, teachers find it still challenging to engage students in productive collaborative learning that extends over time (e.g. weeks – in the context of project-based learning) and is computer-mediated in addition to being classroom-based. I introduce three practices that have been shown to foster collaborative knowledge production and learning: first, group scripts; second, knowledge building and knowledge awareness; and third, group facilitation. I discuss how teachers can integrate these into their teaching practices to address three challenges to productive group learning: unequal participation, lack of awareness, and stratified learning zones.

Introduction

The teaching 'practice' in the case of this paper is a paradoxical one: the teacher ought to get out of the way and hand epistemic agency over to the students. Think of a student-led classroom discussion, where the teacher should perhaps moderate the discussion, but not dominate it – and perhaps not even 'steer' it – or student work in small teams. I want to distinguish two roles the teacher has in such contexts: the role of a collaboration designer and of a collaboration facilitator. Teachers' work as designers takes place in the preparation of students' work, while as facilitators, teachers observe and intervene as students' work unfolds.

Because there are so many forms of collaborative learning, this short paper focuses on the kind of group work that is typically part of project-based pedagogy: small teams of students working over a period of weeks on a research challenge. This pedagogy combines opportunities for subject matter learning with the development of 21st-century skills and contemporary literacies, what the Australian Curriculum calls General Capabilities (ACARA, n.d.). In this kind of project pedagogy, students are co-dependent for the success of the project – they cannot complete the project individually.

'Online' is used in the general sense that technology plays an important role as the tool for doing the project work: for planning, information search, data analysis, and report writing even when students are co-located (e.g. sitting around a table). I will not say much on the particular challenges of virtual team work – or tele-collaboration – as this is still rather atypical for today's schools.

The rest of this paper provides a short overview of how three pedagogical strategies can be used to address three typical challenges of student team collaboration that occur in the context of project-based learning. The strategies are scripting, group awareness tools, and facilitation. The challenges are unequal participation, lack of awareness, and stratified learning zones.

Strategy 1: Scripting to reduce unequal participation

The problem of unequal participation in group work is well documented. It can, for instance, take the form of free-riding (Albanese & van Fleet, 1985). Unequal participation is challenging to address because it is rational to not invest effort into a group task when others are already taking care of that task. In the context of education and learning, this rationale is problematic because task engagement is required in order to provide opportunities for learning.

Participation can be regulated by external or by internal means. Scripting is a form of external regulation: students are assigned different roles by which roles, tasks, and sequences of task execution are externally structured and regulated by specific scripts (Fischer, Kollar, Stegmann, & Wecker, 2013). In order to support a group to internally regulate – or self-regulate – awareness tools can be deployed. They induce and support student and group coordination and regulation by offering information on different aspects of the group situation (Hesse, 2007). Group awareness tools (GATs, see Janssen & Bodemer, 2013) can provide social information or cognitive information. *Social group awareness tools* present information on participation rates and other behavioural measures. *Cognitive group awareness tools* offer information about one's own knowledge, skills and opinions about a topic as well as knowledge, skills, and opinions from the other collaborators, information that is not directly observable. Both kinds of group awareness tools aim to improve group sharing, elaborating and acquiring knowledge.

Social awareness tools are particularly well suited to address the issues of unequal participation. They typically visualise the degree of active participation (when, what, how and why) gathered from different sources (chat, email, task area). For example, in a line of research at The University of Sydney, awareness tools have been developed that support students who learn to develop software in teams (Reimann & Kay, 2010). Information on team performance was gathered from various places – a ticket system for task planning, a wiki, a software versioning system – and visualised in a variety of forms, such as social network diagrams and a new visualisation called Wattle Tree. It combines information across all the three activity areas into one comprehensive visualisation. It was found that this kind of visualisation was particularly valued by student team members who were in the role of team leader, as it helped them to communicate individual team members' contributions and effort without having to use a normative language.

Raising awareness as well as scripting are design tasks: teachers need to think ahead about whether and what kinds of role and task distributions they want to bring to a collaboration activity and decide on the tools to capture student contributions. Raising awareness can also be accomplished by teacher observation of student teams and feeding information back to them.

Strategy 2: Creating knowledge awareness

In the context of collaborative work and learning it is not trivial to know what the others know. For instance, studies by a group of German researchers (e.g., Engelmann & Hesse, 2011) show that the efficiency of groups – for both work and learning – depends on knowing what the others know (knowledge awareness) and what information the others have access to (information awareness). These and other studies have

shown that group performance on problem solving and decision making is negatively affected by group members' reluctance to share relevant information – the information that only an individual member may have. Engelmann and others demonstrated that using distributed concept maps as a knowledge-sharing device increases knowledge sharing and that this leads to better collaboration and problem-solving performance. Concept maps in these instances functioned as cognitive awareness tools.

In addition to concept maps, externalising knowledge, opinions, and understanding are usually conducted by obtaining learners' subjective ratings and by using tests such as multiple-choice knowledge tests (e.g., Sangin, Molinari, Nüssli, & Dillenbourg, 2011). The positive effects of cognitive group awareness tools can be explained by the fact that comparisons of participating collaborators' knowledge, understanding, and opinions are directly available and easily derivable, thus triggering discussion and reflection of shared information and knowledge that, in turn, positively affects group regulation (Kirschner, Kreijns, Phielix, & Fransen, 2015).

To raise knowledge and information awareness, teachers need to think of strategies when designing for collaborative project-based learning. When using forms such as quizzes and tests to this purpose, it is important to communicate to students that this is done for the purpose of creating awareness, not meant as an assessment.

Strategy 3: Facilitating productive zones of learning

While unequal participation and lack of awareness can affect just about any form of collaborative learning, the third challenge is more specific to collaboration in the context of project-based pedagogy. It results from the tension between *performing* team work and *learning* in the context of team work, from the difference between completing a project on the group (or classroom) level and individual learning.

In general terms, it takes the following form: as students self-select roles and tasks, or self-organise these allocations based on each other's judgements of capacity and proficiency, stratified learning zones emerge. A stratified learning zone is a 'design-engendered hierarchy of student learning trajectories, each delimited in its conceptual scope, and all simultaneously occurring within a classroom' (Abrahamson & Wilensky, 2005, p. 1). Learning zones limit what can be learned from functioning in a role. For instance, a goal keeper in a soccer team will not have much opportunity to develop the skills for dribbling. The same logic is at work in other kinds of teams, but then it is typically much less obvious. For instance, in the math class in Abrahamson, Bliksten, and Wilensky's study (2007), the task was for students to construct together a physical artefact made from paper. While the underlying math is basic probability theory, only a few students in this task engaged in mathematics. The others found themselves busy with the mechanics of building the paper artefact. Crucially, those students who were comparatively poor in math allocated themselves to tasks that required little if any mathematical knowledge. While this was completely rational from the perspective of organising team work, it reinforced existing inequalities regarding pre-instructional (in this case mathematical) knowledge. Further worrying was the fact that only a few students in the classroom had an overview of the relation between the mathematical and the physical aspects of the activity; even so the group performed the task quite well, only a few students gained an understanding of the overall task and the mathematical ideas behind it.

This is a serious challenge to collaborative learning as the logic of distribution of labour is partially at odds with the requirements for learning from the activities performed in a team. Addressing this problem requires careful teacher planning. The scripting of roles and activities, such as in variants of the 'jigsaw' design (Aronson, Blaney, Srephan, Sikes, & Snapp, 1978) may seem a solution, but such arbitrary regimes for role switching are liable to undermine students' sense of ownership of process and the artefact produced. What is called for here are deeper solutions that combine group knowledge awareness with a sense of shared responsibility for the artefact and the ideas that it is imbued with (Scardamalia & Bereiter, 2014).

One way to accomplish this is group facilitation. A facilitator is 'one who contributes structure and process to interactions so groups are able to function effectively and make high-quality decisions' (Bens, 2012, p. viii). A key task for a facilitator is to ensure equal and open participation—and equal opportunities for learning when the group work has a pedagogical function. Since this is a demanding task and requires careful observation of each team in a classroom, teachers may want to assign facilitation functions to students – what I call peer facilitation (Reimann, Bull, & Vatrapu, 2013). This is not only practical for the teacher, but also a great opportunity for students to practice basic process leadership skills.

Conclusion

Even though group work for learning is a well-established and extensively researched pedagogy, teachers find it still challenging to engage students in productive collaborative learning that extends over time (weeks in the context of project-based learning) and is technology-rich. This paper introduced three practices that have been shown to foster collaborative knowledge production and learning: group scripts, knowledge awareness, and group facilitation. I showed

how these strategies can be deployed to address three key challenges for collaborative learning: unequal participation, lack of knowledge awareness, and stratified learning zones. To identify the main tasks for teachers, we distinguished between teachers in a design role and in a facilitator role.

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