Learning Groups for MOOCs Lessons for Online Learning in Higher Education

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Abstract. When there is interaction within online learning groups, meaningful learning is achieved. Motivating and sustaining effective student interactions requires planning, coordination and implementation of curriculum, pedagogy and technology. For our aim to understand online learning group processes in order to identify effective online learning group mechanisms, comparative analysis was used on a massive open online course (MOOC) run in 2015 and 2016. Qualitative (interaction on the platform) and quantitative (survey) methods were used. The analysis revealed several possible ways to improve group processes. In particular, this paper concludes that course organization helped in increasing individual participation in the groups. Motivation by peers helped to increase sustainability of interaction in the learning groups. Applying these mechanisms in higher education can make online learning groups more effective.

Keywords: Online learning groups · MOOC · Higher education · Online learning

1 Introduction

The proliferation of ICT in teaching and learning has created new possibilities for supporting collaborative and cooperative learning in distance learning (Muyinda et al. 2015). Collaborative learning hinges on the belief that knowledge is socially constructed although each learner has control over his/her own learning. Vygotsky argues that a person's learning may be enhanced through engagement with others. Learning groups have been preferred for propelling interaction and learning. However, motivating and sustaining effective student interactions are not easy to achieve. That requires planning, coordination and implementation of curriculum, pedagogy and technology (Stahl et al. 2006).

Learning groups have been widely used to enhance learning in higher education and more specifically in distance learning. This is done by giving group assignments to help in the initiation of learning groups. However, challenges of co-locating students and participation of each group member lead to some students not participating on the group assignment. Often, their names are still attached to the work. This causes high failure rates at the end during summative assessment (Aguti et al. 2009), since the

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students that do not participate, fail to harness the benefits of the rich learning experiences from group members. Therefore, effective ways of engaging learners online can offer possibilities of enhanced interactions among students in learning groups.

This study was carried out on a MOOC titled "Success - Unleash Yourself" run by the University of Agder using the NovoEd platform[1]. The course has been run twice in 2015 and 2016 each from January to March. Our study is aimed at understanding online learning group processes in order to identify effective online learning group mechanisms. Online Learning groups can help to bring distributed students together to work. The goal was to establish processes of effective online learning groups in the MOOC. The research questions to be answered are how to form effective learning groups and how to sustain effective online learning group's processes. Further on, we answered the question of how to increase interaction of students during online learning group process. Interaction is usually encouraged so as to increase learners' engagement when completing group assignments.

Collaborative learning refers to instructional methods that encourage students to work together to find a common solution for a given task (Ayala and Castillo 2008). Collaborative learning involves effort by groups of students who are mutually searching for meanings, understanding or solutions through negotiation (Ashley 2009; Stahl et al. 2006). Collaborative learning occurs where there are interactions. Anderson in his online learning framework argues that for meaningful learning to happen, there must be high interaction in any one of the student-teacher; student-student and student-content interactions (Anderson 2003). Mayende et al. (2014) and Stahl et al. (2006) also asserts that learning takes place through student-student interactions. Ludvigsen and Mørch (2010), found out that students effectively develop deep learning when supported by computer supported collaborative learning. Therefore, a well-structured course to enhance group work can enable student-student interactions in computer supported distance learning (Mayende et al. 2015). Collaborative learning is based on consensus building through interaction by group members, in contrast to competition. Collaborative activities are essential to encourage information sharing, knowledge acquisition, and skill development (Collison et al. 2000).

The rest of this paper is organized in four sections. Section 2 presents the approaches and our research methods. In Sect. 3, presents the findings of our work and discussions. Finally, the paper is concluded in Sect. 4.

2 Approaches and Methods

This section describes the course design for learning groups and the research methods used. This is described in the following subsections: modules, learning groups, student support and methods.

[1] https://novoed.com/success-agder-2016

2.1 Modules

The course was composed of four modules with specified tasks and activities, paced according to a course calendar. Students were expected to complete all modules. The first module takes two weeks to establish the background and to connect the students. This helps in establishing social connection among students so that forming learning groups becomes easy. After that there are three modules that last for two weeks each and all of them follow the same basic structure (see Table 1 below). The last week is used to wrap up the course and to sketch the way ahead.

Table 1. Basic timeline for a module

Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu
0		1			2	3	4		5	6			7		8		9

Table 1 shows the timelines for a module with the following activities.

- At point "0" the module content and the tasks for the first week are announced.
- At point "1" the first task is reading of the theory presented. This helped the learners to underpin their discussions in the open forums on the module theories.
- At point "2" individual students answer to the group activity as a starting point. This helped in building initiation into the group activity. Each learner comes into the group with their opinion about the group activity. This helps to increase participation in the learning group.
- At point "3" the reading is concluded with a quiz. This helped to assess the learners on the theories of the module. The quiz is developed in such a way that the learner can attempt the quiz three times. In each attempt the learner is given detailed feedback which enhances more learning about the theories.
- At point "4" tasks for the second week are announced.
- At point "5" the deadline for group hand-in is reached. This hand-in is based on the group's discussion and individual student answer to group task. It is during the group deliberations that the groups agree on final submission and the member who submits.
- At point "6" learners start working on individual hand-in with emphasis on group support. The team members are encouraged to consult their teams when working on the individual activity which is connected to the group activity but contextualized for each individual. Since learners have already worked on the group activity it is easy for the learners to consult one another when working on their individual submission.
- At point "7" soft deadline for individual hand-in.
- At point "8" hard deadline for individual hand-in; peer assessment of individual hand-ins begins.
- Finally, point "9" has the soft deadline for peer assessment of individual hand-ins (hard deadline on Friday that proceeds). The tasks for each week are displayed on top of the platform every time you login. This is an important affordance of the NovoEd tool.

2.2 Learning Groups

In the first module there were auto-assigned learning groups of around 30 students. In the other modules the learning groups were self-formed and each group had at most 5 members. The activities created for module one were aimed at connecting students and getting familiar with the platform. This was good in building social connections in learning groups. A juggling activity was used in the first module. Learners were required to learn how to juggle and the submission required them to make video recording when they are juggling. This activity has a game concept which makes learners enjoy and get to know one another with ease. Since the juggling submission is seen by all learners, it helped in enforcing social connection. Activities were designed in such a way that each activity could build on another one within the module. For the activities to enhance group work, learners start with presenting individual answers to group activity. This is then followed by group discussion and hand-in. The learners are then given contextualized individual activity which is built on the previous group activity. Finally, there are at least three peer assessments on individual hand-ins. The final individual activity would be peer assessed using a pre-defined rubric which was developed by the course facilitators. In addition to the peer assessment, each assignment would get more feedback from students through comments. All the submitted activities are accessed by all the students in the course with possibility to comment and respond to comment. This encouraged interactions among learners online and student support.

2.3 Student Support and Peer Feedback

Student support is important for online learning courses. Forums were created on the platform to help in giving or receiving feedback from the students or facilitators. They were created in order to harness the experiences and knowledge from the community of participants. The student support ranged from technical to subject matter. This was developed with the aim of allowing feedback to come from the students themselves given the student numbers in the MOOC. This fits well with the growing student numbers in higher education.

Peer feedback was encouraged since all the submissions were accessed by the students in the MOOC. This allowed learners opportunity to give peer feedback through comments. Each submission received at least one feedback.

2.4 Differences in the MOOC

Most of the content of the course were the same. However, there was an emphasis on participation in the announcement for the MOOC of 2016. The announced placed on the platform clearly stated that “this is not a usual MOOC, because it is designed for active students. You have to pay for taking it by putting in at least 10 h of your time each week. The course features only a few videos, and the learning outcome is achieved by working on the tasks”. This is perceived to have played a big role in improving the course. In this course deadlines were changed from hard to soft. This

seemed to have had a good impact on the learner's participation in the course. There was also flexibility on limits of the group size. In the 2015 MOOC there was fixed limit of five (5) members per group. However, in 2016 MOOC limits of Group size were changed to seven (7) members.

2.5 Methods

This paper is based on a comparative analysis of the course for 2015 and 2016. Qualitative and quantitative methods were used in collecting data and analysis. This helped in data triangulation. Two course surveys that is mid-term and course-end were run. These surveys were responded to by learners on the two MOOC courses. Mid-term survey had 27 respondents for 2015 and 36 respondents for the 2016. Course-end survey had 61 respondents for 2015 and 66 respondents for 2016. Observation was done on two online learning groups. The interactions on the forums were also used in the analysis.

3 Findings and Discussions

The course design helped in engaging students to participate with the course literature. At the end 1.44% of the students received statements of accomplishment in the first MOOC course and 5.04% of the students received statements of accomplishment in the second MOOC course. The findings are presented in the following subsections: course organization, learning groups and activities, learning group motivation, learning group interaction, learning groups peer-feedback and peer-assessment, and learning group collaboration tools.

3.1 Course Organization

This subsection describes the course organization. The organization determines the success and interactions of the learning group. Mayende et al. (2015), established that peer based assessment organization increased interaction and learning among group members. The course organization which puts emphasis on learning group is shown in Fig. 1. Initially, the students within the groups would submit individual work for the group activity. This helps to initiate the learners to learning group activity and each learner to contribute to the learning group discussion. The points of disagreement from individual viewpoints increased the learners' meaningfully learning. An individual submission is open to the entire class to give feedback which helps in the interaction and learning processes.

The individual answer to the group activity helps in the learning group discussions/processes. The students discuss/find solution for group activity online either synchronously or asynchronously. Once the group answer has been arrived at it is submitted/handed-in. However, group hand-in is accessed by all the students on the MOOC with affordances of peer feedback. The students are encouraged to give feedback to other group submission. After submission of the group work, the students work on the

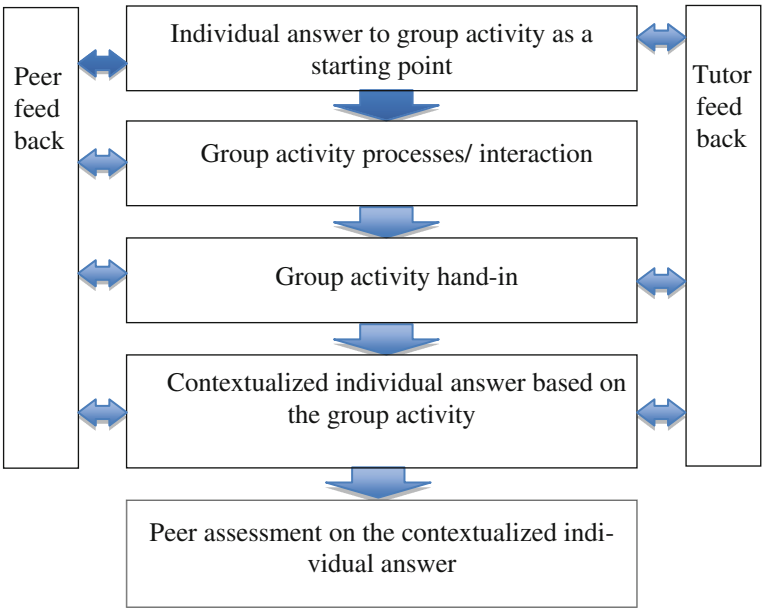

Fig. 1. Course organization

contextualized individual answer which is based on the group activity. The students are encouraged to consult with group members when working on this individual answer. Then the submission is peer assessed by at least three students using the rubric developed by the facilitators of the MOOC. This course organization made group formations very easy and encouraged interaction among students.

The students were asked to reveal their perception about the course organization by asking the participants to indicate their levels of agreement to the statements regarding course organization. Table 2 below indicates the percentage agreement with the statements for the MOOC of 2015 and 2016.

In both MOOCs the students perceived the courses to be well structured, activities to be well organized and assessment rubrics to be very clear. This is important in ensuring

Table 2. Course organisation

Statements	2015	2016
The course is well structured	93%	83%
The activities are well organized	86%	86%
The assessment rubrics are clear	89%	89%
The quizzes support my learning	43%	97%
I would need to be on campus to study this course efficiently	32%	17%
I believe that forum discussions are essential for this course	46%	69%
Cafeteria forum helps me get to know members of the group	39%	61%
I am achieving my learning expectations	11%	89%

that online courses in higher education are successful. This is in agreement with our earlier study which indicates that a well-designed detailed course guide can lead to an effective online learning group (Mayende et al. 2015). The respondent's perceived quizzes to support learning in the 2016 MOOC as shown in the Table 2. This might be one of the reasons for the difference in the completion rate. The quizzes were designed with aim of helping learners understand the theories of the course. This indicates that the 2016 MOOC benefited more in the area and the other MOOC missed out. Generally, students in both MOOCs did not agree that they needed to be at campus to study this course efficiently. This is in agreement with already distance learning programmes which are offered at the same competence level. Participants revealed the importance of forums; 46% believed that forum discussions were essential in the course in 2015 and 69% in 2016; 39% agreed that cafeteria forums helped in getting to know the members of the group in 2015 and 61% in 2016. This indicates that there was more interaction in the forums in 2016 than in 2015 which would be another cause for the better completion rate in 2016. The learners also perceived that they achieved their learning expectations in 2016. This could be another reason for better completion rate for the course.

Learners revealed that the following teaching resource contributed to learning output as shown in the percentages in Table 3 below.

Table 3. Teaching resources

Statements	2015	2016
Learning videos	87%	82%
Story videos	71%	77%
Group challenges	56%	70%
Individual challenges	84%	86%
Success wiki	76%	80%
Peer evaluation done by students	52%	67%
Peer evaluation received by students	46%	62%
Forum discussion	41%	53%

We can see differences in group challenges, peer evaluation done by students and peer evaluation received with advantage skewed towards the MOOC of 2016. There is still to do more to boost group assignment's contribution to the learning so that more completion rates can be achieved. This can be done by the facilitators increasing on the feedback they give. When asked about the effectiveness of the learning groups 44% felt that it was 70% and above effective, 40% felt that it was 40% – 60% effective, 16% felt it was below 40% effective. The organization of course organization played a big role in the effectiveness of the learning groups. However, this should also be coupled with appropriate online learning groups and activities.

3.2 Learning Groups and Activities

The group activity is important in ensuring success and interactions of a learning group. A well-structured course can help make the group activity easy to execute.

The students were asked to reveal their perception regarding activities and learning groups. The participants were asked to indicate their level of agreement to the statements regarding activities and learning groups. Table 3 below indicates the percentage agreement with the statements on both MOOCs.

In both MOOCs students agreed that activities were clearly described with enough time allocation to the activities. This is important for online courses since these types of learners are doing many things in additional to studying. These are typical of distance learning students who are working and studying at the same time, which is common for the learners of today. If the activities are not clearly described this can lead to higher dropout rate especially for the online courses. This can also apply in higher education. It is important for online courses in higher education to ensure that the activities are clearly described with enough time allocation to the activities. The students were in agreement that the activities were connected to the overall course objective. With activities which are connected to the course objective, this will help to ensure that the learning outcomes are met. The students also felt that the course resources helped them in doing the group activity. Having course resources that are connected to group activity will go a long away in ensuring effectiveness of the learning group. Though having indicative course resources to do group activity is important, students should be allowed to be innovative and bring in new course resources when doing their assignments. This is possible with an online learning community. As shown in the Table 3, students of the MOOC of 2016 agreed to the roles and processes for problem solving more than the MOOC of 2015. This shows that there are better group dynamics in 2016 as compared to 2015 which can be one of the reason for the better completion rate in 2016 than 2015. For purposes of effective social group connection it is important for the group members to agree on the roles and processes within the group. Higher education should encourage learners to agree on their roles in order to have effective learning groups. Results also revealed that only a few participants in both MOOCs were frustrated with one or more group members and the group size was big and distracted the group. The group size of five (5) members can bring about effective interaction and group deliberations. Since group size was five that is the reason they felt that they were not distracted by the group size.

Students were also asked their perception of their learning groups. Table 4 shows the percentage of respondents who perceived the statements to be true about their learning groups in both MOOCs.

Table 4. Learning groups and activities

Statement	2015	2016
The activities are clearly described with enough time allocated to the activities	71%	75%
The activities are connected to the overall course objective	75%	89%
The course resources help me in doing the group activities	68%	83%
Members agree about roles and processes for problem solving	43%	72%
I am frustrated with one or more of my team members	29%	14%
Group size is too big and distracts the group	14%	11%

On average 55% of respondents agreed with positive statement about learning groups in 2016 and 40% in 2015. The statements included the following "Our team members were supportive and encouraging each other", "I received positive feedback from my peers". "Our team members respected my opinions". The above statements indicated high percentage of agreement. These help in motivating and sustaining interaction within learning groups. However, students never reached levels of sharing jokes during their group discussion which is indication that the groups had not got to high levels of group dynamics as indicated in the Tuckman five stage model. Learners shared jokes in the 2016 MOOC compared to the 2015 which could be a reason for better completion rate. These elements are very important aspects of effective online learning groups in helping to motivate members. In higher education it should be encouraged to let students know that support, encouragement, positive feedback, respecting opinions from group members are important aspects for effective online learning groups (Table 5).

Table 5. Learning groups

Statement	2015	2016
Our team was effective	41%	62%
Our team members were supportive and encouraging each other	46%	65%
I received positive feedback from my peers	48%	68%
We shared jokes in my team	13%	21%
I was active in my team	51%	56%
Our team members respected my opinions	41%	55%

3.3 Learning Group Motivation

Motivation is important for sustainable online learning groups. Motivation is not one-off event but a continuous process throughout the learning group life. Students agreed that they were motivated by their peer's interaction within the group. One of the students said "The more you get quick feedback on your submissions definitely the more you get motivated". Eighty six percent (86%) were in agreement with the above statements in 2016 and 50% in 2015. For effective online learning groups in higher education group members should be motivated within the group by their peers and facilitators. Gallimore and Tharp (1990), suggested that positive feedback encourages learner participation.

On average 56% of the respondents for 2016 MOOC and 32% of the respondents for 2015 MOOC were motivated by the following aspects: positive feedback from team members, level of commitment from team mates, not to let down the learning group and encouragement to express individual concerns. This is in agreement with educational psychologists who believe that positive rewards play a big role in encouraging participation and interaction (Gallimore and Tharp 1990). Students were given guidelines on how to respond within the groups e.g. encouragement to give positive feedback. Guidelines on how students should behave are very important to the motivation of learners in online learning groups. This is equally important for higher

education. Therefore, encouraging students to give positive feedback will help in motivating the learning group members. When interactions or commitment within the group are high, the other students will fear to let down their team members. Motivation is vital in sustaining interactions and learning in learning groups.

3.4 Learning Group Interactions

Student interactions are important in increasing learning in learning groups (Anderson 2003). Interactions are encouraged through course organization. The organization allowed open feedback on all submissions by all the students. The students received feedback through comments on their submissions. Though the cafeteria forum was meant for social discussions, it generated a lot of content-related interactions. Students interacted with classmates using questioning which generated a lot of discussions. Questioning that provoke other learners to think more or read content can help in assisting learning (Gallimore and Tharp 1990). Some of the examples picked from the forums that used questioning:- "I agree with your thoughts on being successful in learning regardless of the type - good or bad - of experience. Do you think that almost everyone wants to be successful in learning?" and "Not achieving/finishing a task is not always failure; sometimes it is success delayed. What do you think?" This encouraged many students to interact with classmates through these forums.

There were also forums created with the aim of supporting students on both technical problems and content. These forums equally received a lot of posts and comments which helped the students in getting support from other students and tutors. Because forum interactions are open to all students and tutors, the interactions were quality assured since corrections are made in case some person gives wrong comment.

Students felt that they are able to improve their ability to express thoughts online. In 2016, 89% responded in agreement that they were able to improve their ability to express themselves while there was 50% for 2015 MOOC. This shows that the students started finding interaction interesting and easy which could be an indication difference in completion rate.

Students were asked their perception of their interactions in learning groups. The Table 6 shows the percentage of respondents who perceived the statement to be true about their interactions in the learning groups.

The statements were required to understand the level of interactions in the groups based on Bloom's taxonomy. The interaction questions were based on the verbs remember, understand and analyze. Remember is based on recalling facts and basic concepts, understand is based on explaining ideas or concepts and analyze is based on

Table 6. Learning group motivation

Statements	2015	2016
I was motivated by the positive feedback from my team members	46%	62%
I was motivated not to let down my team	33%	53%
I was motivated because I was encouraged to express my concerns	23%	42%
I was motivated by the level of commitment from my team mates	26%	65%

drawing connections among ideas. On average 52% of the respondents in 2016 MOOC perceived their interaction to lower levels of remembering and understanding while 37% of respondents in 2015 MOOC. This can be improved by facilitators getting involved in the interaction to provoke for higher level cognitive interactions. However, it is not easy for MOOCs given that the numbers of students are usually very high. This can be done in higher education by the facilitators provoking students during their interactions in the groups. Respondents also revealed that they used personal experiences when discussing the course concepts. This helps learners get new knowledge from authentic examples from more knowledge peers. The interaction was due to the design of the course which allowed peer feedback and assessment.

3.5 Learning Group Peer Feedback and Assessment

Peer feedback played a big role in ensuring interactions with the course platform. Since all the submissions were assessed through the platform the students interacted and helped peers get more feedback on their submissions.

Peer assessment was done on final contextualized individual answer. The facilitators developed rubrics that assisted the students to asses other student's submissions. It was emphasized that each student should give assessment to at least three students. The peer assessment was viewed by the students so that they see how they have been assessed and help them understand better the concepts they had missed out. Learning happens both during provision of peer assessment and receiving peer assessment. Forty percent (40%) of the respondents felt that they were able to get new knowledge through peer assessment for 2015 MOOC and 68% for the 2016 MOOC.

3.6 Learning Group Collaboration Tools

This course was run on NovoEd platform but with flexibility to allow learners use other collaborative tools. Though there are so many technologies that can be used for collaboration student revealed that they used the following tools as shown in Tables 7 and 8.

Table 7. Learning group interaction

Statement	2015	2016
The group interactions required me to remember the course content	39%	45%
The group interactions required me to understand the course content	34%	58%
The group interactions required me to analyse the course content	33%	48%
I was able to use personal experience when discussing the course concepts	41%	61%

Mostly, the NovoEd tool was used in the collaboration of the learning groups. However, other collaboration tools were also seldom used as indicated in the percentages in the Table 7.

Table 8. Collaboration tools

Tool	2015	2016
NovoEd	46%	51%
Social Media (Facebook, Twitter, LinkedIn, etc.)	5%	8%
Email	11%	14%
Online Conference (Skype, webinar)	9%	5%
Blogs (Discussion forum,)	5%	2%
Online shared workspace (Google drive, Dropbox, wiki)	14%	17%
Telephone	2%	3%
Others	7%	2%

Eighty two percent (82%) of the respondents felt that they sometimes got lost in the platform and failed to find what they wanted in the 2015 MOOC while 31% for 2016 MOOC. This shows that students in the second MOOC were more comfortable using the platform than the first MOOC. This has a significant bearing on the effectiveness of a learning group. Likewise 89% of the respondents in 2015 MOOC also felt that it was difficult for them to learn how to use NovoEd unlike 11% for 2016 MOOC. This might have been because many of the students who attended 2016 also come back from the 2015 MOOC. This makes them have fewer challenges using the platform. Fewer respondents 14% felt that they were comfortable seeking help via the forum while the 2016 MOOC had 75% who would get help from the forum (Table 9).

Table 9. Effective collaboration tools

Statement	2015	2016
The group members provided technical support during group work	30%	36%
Our team has used collaborative tools outside NovoEd	13%	30%
In team interaction, it was sometimes frustrating to use technology	30%	20%
NovoEd was an effective tool for team work	46%	62%
Google hangout was an effective tool for team work	20%	21%

About Tools support as shown in the table above – 29% for the 2015 MOOC and 36% for the 2016 MOOC, provided technical support during group work, 13% for the 2015 MOOC and 30% for the 2016 MOOC, used collaborative tools outside NovoEd, 29% for the 2015 MOOC and 20% for the 2016 MOOC, during team interaction, were sometimes frustrated to use technology. 44% for the 2015 MOOC and 62% for the 2016 MOOC, felt that NovoEd was an effective tool for team work, 19% for the 2015 MOOC and 21% for the 2016 MOOC, felt that Google hangout was an effective tool for team work. Tool usability is important for the success of online learning group.

4 Conclusion

We conclude that the course organization structured for online learning groups has the potential to increase individual participation in groups. As such the course organization can be an effective mechanism for facilitating online learning group activities in higher

education. The course organization removes the known burden of supporting large student numbers reminiscent of MOOCs as it increases interaction among participants. The course organization help in providing clear sets of activities well aligned to the learning goals and resources. The increased feedback mechanism within the course organization is good pre-cursor to participation motivation which leads to low levels of dropout. Therefore, for an effective online learning group the following must be emphasized; well-structured course organization that supports group work, well-structured group activities that have the affordances of online collaboration and connected to the goals of the course, guiding students on how to motivate others through feedback and questioning, encouraging interaction within a learning group, learning group tool usability and features that have the affordance of group processes and online technical support.

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