Does the Organisation of Study Groups into Different Knowledge Levels Improve the Performance in a Bachelor Degree Course?

Anna Fensel

University of Innsbruck, Austria

Abstract

Organising students into groups for studying is widespread and being done with an increasing frequency world-wide. However, there is little knowledge available on how to organise and run the student study groups in the most efficient manner. To provide insights and guidelines for the best practices if the study group organisation, the paper describes a case study conducted with 74 Bachelor students at a university in Austria. Various effects of the group splitting by the knowledge level are shown, particularly, the performance successes in the study (the teachers' perspective), as well as the satisfaction from the study groups, work load assessment, fairness, leadership and other competences gained, study journal usage (the students' perspective). Overall, the organisation of the study groups with the size of 3 students at homogeneous knowledge levels has been well accepted by the students and led to a higher study performance at all knowledge levels. Combining the approach with further teaching methods and performance evaluation approach emphasising both the group as well as the individual learning gains can bring further improvements.

Keywords: *Study groups, study performance, university, bachelor course.*

1. Introduction

With numerous study materials available online, the trend of students staying away from the classrooms is on the rise. Attending the classes in person actively can be seen as the highest level of the study engagement. While still a lot of study success can be achieved with learning outside of the classroom, successive lowering of the level of engagement may end up with the students becoming completely disengaged, disconnected, and eventually unfollowing the study.

One of the features typical for and only possible at with the studies in the class is a high degree of communication and group work among the students, compared e.g. to the online study mode where the interaction and group work is weakened, and can take place only via the means of technology. Group work has been recognized as successful for engaging the students, and for the facilitation of the study for the students (better study successes are confirmed e.g. by Liang et al. [1]) as well for facilitation of teaching for the course leaders. However, the question on how to organize the study groups most efficiently remains open, and there has been no literature covering exactly this research question. The question is in particular not trivial in the settings where the classes are composed of the students with varying levels of prior knowledge and study abilities. Some of the challenges include cases when the students distribute the work among themselves and learn less individually, or when more advanced students are placed in a mixed group with weaker students: they are demotivated to such extent that they start to dis-engage.

2. Case Study

The case study has been made in the lecture and exercise university Bachelor degree course "Booking and Yield Management". The course has had the volume of 2 weekly hours during the semester, and has been held from 13th to 28th of May 2019 in a blocked form in Landeck, Austria. The course audience has comprised 74 students, split in 3 groups (27, 24 and 23 students), led by two course instructors: each instructor had an own group, and one group was taught by both instructors.

For the evaluation, first, "the learning journal" (or, what the students should learn from the course) is to be defined, followed by the assessment/exams mode definition. The latter is to be based on the points accumulation system, with points accumulated during the whole course – for the group tasks, as well as for individual tasks. As communicated to the students from the start of the course, they have been able to collect points for:

a)   group work (60 % of the grade),

b)   individual work, including the final test (40 % of the grade),

c)   extra "bonus" points: for placing questions in the forum (one has to post one question and vote for three good ones of colleagues – the best question is to be answered/discussed), and for solving the exercises of "extra" difficulty (supposedly is to be managed only by "stronger" groups).

3. Aim of the Case Study – Testing of Two New Didactic Strategies

New settings of study groups. The first strategy of the case study evaluates the effect of working in various study groups. The students are to be doing course exercises in a group of 3 persons each, with settings requiring both autonomy and structure [2]. The course exercises would, apart from learning, enable demonstration of the autonomy and leadership development. Further, structured ways to get involved with the contents of the course and the means to cut off better at the course evaluations have been provided e.g. possibilities to receive extra points towards the exams grade, particularly for asking questions about the course online and voting / commenting on them.

Approach in the case study. A study mix is elaborated to be heterogeneous and address various student study groups and personality types. The direction here is to split the students in the subgroups of various expertise levels (for the given 3 study groups of ca. 25 students each):

1) mix of "stronger" and "weaker",

2) the students with the similar level of skills together - so there are to be "weak" groups and "strong" study groups,

3) allowing students to mix themselves, to observe which performance takes place naturally.

Then it can be observed which of the set-ups are bringing better learning and engagement results. At the start of the course, the student prior knowledge is to be tested, with a test consisting of a mix of course-relevant questions, a mix of self-assessment questions, and questions about their personality/typical attitudes/levels of engagement. The points which the students have scored have been calculated, and the split into the study groups have taken place already on the first day, with the group work starting from the second day of the course. An additional strategy to be tested here is making the students self-accountable for their study progress with the construction and the maintenance of the "learning journal" i.e. conduction of the diary containing the details of what the students have learned in the course.

4. Research Questions, Hypotheses and Evaluation Design

This work investigates various settings of the study group work to conduct teaching and to increase the study engagement, and eventually identify their added value for the study in the classroom as well as the extent with which they should be applied.The main research question to address is as follows:

Will the organization of the study groups according to the students' competence levels, i.e. students with similar competence levels joined into the same study group versus other ways to form a study group, lead to better learning outcomes for all students at a Bachelor degree course?

Further, the following, secondary, research question is to be addressed and answered: ***Does construction and maintenance of the learning journal (or a diary, representing the learned knowledge or skills in the course) by the students lead to a more positive attitude and better learning outcomes in the course?***

The basic hypothesis/assumption here is that there are different types of learners/ personality profiles, and the currently deployed in education "one-size-fits-all" methods – such as study group work where "stronger" in the subject students teach the "weaker" ones, as well as just one "typical" combination of methods are inevitably not matching well or addressing poorly certain learner groups on every course. In the worst case scenario, the "wrong" mix can cause the students, for example, the "stronger" ones, to disengage and eventually unfollow the course. While user segmentation and personalized addressing is very common in such fields as marketing or gaming (e.g. see existing categories for user gamification types [3]), the studies for similar directions in eLearning/education domain are just appearing (see Gil et al. [4]), and are generally not applied in practice.

The approach is to be evaluated from the perspectives of the lecturer and of the students.

Lecturer's perspective. The data collected in order to reflect the lecturers' perspective is as follows:

a) observation notes about students' engagement in learning activities, such as study group work and individual work.
b) results from the (final) exams, as assessed by the course instructors. Here, these are the grades for study group exercises and individual tests.

Students' perspective. The evaluation of the case study includes:

a) feedback from the students in which kinds of study groups they were more productive in learning and found most engagement as self-assessment
b) their actual demonstrated productivity/study success, which can be represented as the students' education progress on the "learning journal" (as self-assessment).

The students' general perception of the success of the study group work is partly estimated with questionnaires already present in the literature: such as Table 1 is mirrowing the work by Burdett [5].

5. Presentation and Interpretation of Results

The study has been running as planned, and the students have been formed in 22 study groups, on the basis of the individual scores in the initial test (see Appendix A for the test); all Appendices mentioned in this paper are available via https://doi.org/10.13140/RG.2.2.17908.68485.

We use the following notation for the study groups: A – "stronger" study groups, B – "average" study groups, C – "weaker" study groups, M – mixed study groups (have 1 "weaker" student, 1 "average" student, and 1 "stronger" student), N – study groups created in a natural way, by the students themselves.

Correspondingly, 3 A study groups, 5 B study groups, 2 C study groups, 4 M study groups and 8 study groups N have been formed. The study groups A, B, C and M have been formed on the answers of the questionnaire, with the students getting between 6 and 9 points on this test classified as A students, students gaining between 4 and 5,5 points classified as B students, and students gaining between 1,5 and 3,5 points were classified as C students (see Appendix A). Further, we present the evaluation in terms of different perspectives (lecturers, students).

Perspective of the lecturers. One key criterion is an observation of the study performance (individual and study group work, final individual test, forum questions, bonus exercises and learning journal). *Another criterion to observe is the students' performance on the individual final test (see the final test in Appendix D).The study performance is evaluated with the group and individual study progress, including the final individual test.*

In A study groups 7 out of 9 students, in B study groups 14 out of 17, took the final test. In study groups C, M and N everyone took the test. It is likely be the case because compared to the study groups A and B they were less active in other exercises or assumed that they performed weakly, and thus assumed they still need more points.

The results for this criteria (including the grades, bonus exercise activity and the average score for the individual test) are shown in Table 1.

The final average grades presented in Table 1 are calculated with the summing of the final grades received by the students in the all types of the groups (A to N) and dividing these grades by the number of the students in the corresponding study group category (n).

For the grading of individual students, the usually applied in Austria grading system was employed i.e. between 1 and 5, where 1 is the best (excellent), and 5 is the worst (fail). The scores for the bonus exercise activity participation, as well as for the individual final tests are also average values, calculated in a similar manner.

The overall evaluation of the work of the students show that homogeneous study groups (A, B, C) have managed to achieve better academic grades than the heterogeneous study groups (M and N). On the other hand, in the individual final tests, the A and B study groups have scored the worst - with 8 and 8,6 points on average out of 20 points, while the study groups C, M and N scored better: 10,75, 10,54, and 11,75 points on average out of 20 points (the questions and the points awarded for them are shown in Appendix D). In A and B study groups the performance of the students have been different: there were "strong" and "weak" cases, so this is not a monotonous drop for all.

Table 1. Study performance of the students of various study groups.

Study group type	Final average grade	Active in bonus activities, in %	Average score in the individual final test (when taken)
A (n=9)	1,89	87,5	8,00
B (n=17)	1,94	50,0	8,60
C (n=6)	2,00	66,7	10,75
M (n=13)	2,30	69,2	10,54
N (n=24)	2,30	77,3	11,75

Table 2. Students' feedback on group work in various study groups.

Questions	A (n=8)	B (n=15)	C (n=6)	M (n=13)	N (n=23)
1. My experiences with formal, assessed group work have been positive.	1	1	0,83	1	1
2. I felt comfortable working in my group.	1	1	1	1	1
3. Overall, my group worked well.	1	1	1	1	1
4. I did not enjoy working on group assignments.	0	0,07	0,5	0,15	0,44
5. I often assumed a leadership role.	0,29	0,5	0,2	0,15	0,57
6. Overall, I did most of the work.	0,25	0,07	0,5	0,17	0,26
7. Working in a group required less work for myself.	0,63	0,48	0,4	0,77	0,83
8. Overall, the grades for our group work were fair.	1	1	1	1	0,95
9. Problems that arose were solved by the group.	0,88	0,93	0,33	0,85	1
10. I achieved better outcomes working alone.	0	0,2	0,6	0,23	0,55
11. Marks awarded were generally fair.	1	1	1	0,92	0,9
12. Peer assessment was generally fair.	1	0,93	1	1	1
13. I learned to negotiate with other group members.	1	0,8	1	0,92	0,91
14. I learned to build positive relationships in my group.	1	1	0,83	0,92	0,91
15. I learned to manage tasks effectively.	1	0,8	0,83	1	0,91
16. I learned to share responsibility.	1	0,93	0,83	0,85	0,91
17. I learned to use rational argument to persuade others.	0,63	0,87	1	0,67	0,82
18. I learned to solve complex problems.	0,75	0,67	0,83	0,92	0,7
19. I learned to resolve conflicts.	0,63	0,27	0,5	0,73	0,7
20. I ran the study journal largely throughout the course.	0,88	0,5	0,67	0,69	0,78
21. The study journal was helpful for my learning process.	5 out of 5	4 out of 8	2 out of 3	4 out of 10	7 out of 14
22. The study journal was helpful for my learning outcomes.	4 out of 4	4 out of 9	2 out of 3	3 out of 8	9 out of 12

So for the individual learning success, one recommendation may be to collect people in C study groups. Though they will report a lot of pressure, and won't report that they enjoy the study group

work, they will learn the most. Also N study group have done well, and interestingly - they also have been reporting that they had issues with the study group work, compared to the others. It is possible that the study groups such as A and B were too good in splitting the work among themselves and avoiding studying the basics on their own, therefore having worse results on the individual tests.

What in any case is also dissatisfactory for the A students is when they are placed in a mixed study group with weaker students. Also here "stronger" students, which have been placed in an M groups construction, have been reporting dissatisfaction. Overall, though, the activity on the course of the students have been good, and the methods have found their followers. As also seen later in Table 2, a fair number of the students have been following the learning journal, as well there was enough activity on the course forum.

Perspective of the students. The evaluation of the students' perspective of the study group work has been performed by the questionnaire distributed to the students (see Appendix B). Table 2 presents the scores from this questionnaire, presenting the average scores received per each question per each of the study groups, where the answer "agree" has counted with 1 point, and the answer "disagree" with 0 points.

6. Summary of findings in the light of research questions

The findings of the study can be outlined as follows:

1) **The study groups as a method is verified as appropriate.** *The students are in favor of the study group work in principle*, and are considerably more in favor of it and are satisfied with it compared to another similar study in the past that has been measuring the same metrics [5]. This may be caused by the fact that the study groups in this study were efficient i.e. consisted only of 3 people, in the contrary to the settings of the other experiment [5], which had between 2 and 10 people per group.

2) **Homogeneous groups function better than heterogeneous groups only according to some performance criteria.** Whether to recommend one or other type of the study groups, also appears to depend on what the learning and study group work goals are, as the feedback varies. *Homogeneous study groups are better at achieving the goals* (such as getting better grades) than the heterogeneous ones, however, still not necessarily better at learning individually. *The study group work more enjoyable in stronger, homogeneous study groups. Creating study groups "with issues"* (e.g. weak study groups, or naturally formed study groups) *typically leads to less enjoyment from a study group work, but better individual learning outcomes*.

3) **Different students are responsive to different methods.** *The learning journal technique have been found useful by a limited number of students only.* So it can be recommendable for a segment of students, but not for all. Such diversification could be facilitated by online methods [6].

References

[1]   Liang, D. W., Moreland, R., & Argote, L. "Group versus individual training and group performance: The mediating role of transactive memory". *Personality and Social Psychology Bulletin*, *21*(4), 1995, 384-393.

[2]   Jang, H., Reeve, J., & Deci, E. L. "Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure". *Journal of Educational Psychology*, *102*(3), 2010, 588.

[3]   Tondello, G. F., Wehbe, R. R., Diamond, L., Busch, M., Marczewski, A., & Nacke, L. E. "The gamification user types hexad scale". In *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play*, ACM, 2016, 229-243.

[4]   Gil, B., Cantador, I., & Marczewski, A. "Validating gamification mechanics and player types in an E-learning environment". In *Design for Teaching and Learning in a Networked World*. Springer, Cham., 2016, 568-572.

[5]   Burdett, J. "Making groups work: University students' perceptions". *International Education Journal*, *4*(3), 2003, 177-191.

[6]   Vezirov, T. G., Kormakova, V. N., Fensel, A., & Lapina, M. A. "Practical implementation of the process of digitalization of education in Master programs". *ARPHA Proceedings*, *3*, 2020, 2731.