What Can Teachers Do to Make the Group Work Learning Effective – a Literature Review

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Abstract

Group work-based learning is encouraged in higher education on account of both pedagogical benefits and industrial employers's requirements. However, although a plenty of studies have been performed, there are still various factors that will affect students' group work-based learning in practice. It is important for the teachers to understand which factors are influenceable and what can be done to influence. This paper performs a literature review to identify the factors that has been investigated and reported in journal articles. Fifteen journal articles were found relevant and fifteen factors were identified, which could be influenced by instructors directly or indirectly. However, more evidence is needed to support the conclusion of some studies since they were performed only in one single course. Therefore, more studies are required on this topic to investigate the factors in different subject areas.

1 Introduction

Most courses in higher education contain one or more assignments or projects that require students to work in groups. It is due to both the pedagogical reason and practical reason [1]. Industrial employers usually require graduates being capable of working in teams, which motivates higher education educators to develop more on students' group work abilities [1, 2, 3, 4, 5]. Moreover, a large amount of studies reported that the group work experience has many positive impact on students' learning, various benefits range from motivating [6], responsibility building [7], individual accountability, social skill training [8], collaborative problem solving [9], to group processing ability training and deep learning [10]. Practically, organizing sutdents to as groups enables teachers to effectively handle the increasing number of students enrolled in higher education. It can also improve the first year experience of many students that have isolation feeling at the beginning of their higher education [11].

The benefits are many and the expectation is high. However, problems exist in this type of group work-based learning, which will affect the experience and outcome of students' learning. Many studies have been performed to investigate or discuss the impact of the different factors that affect the group work learning. For example, as a big threat to group based learning, the impact of "free riders" existing in a group, some studies documented it as social loafing, has been investigated or discussed in [12, 13, 14]. Although the result in [14] shows that the appearance of free riders does not significantly decrease the quality of the group's project work, the expected outcomes such as responsibility building, social skill developing and group

processing training are certainly affected. A related factor, fair grading and evaluation of group work delivery, has also been studied, from peer evaluation method [1] to lecture participation and assessment [15]. Course design, group members' language proficiency and multi-cultural background [2, 16] are thought to be impact factors to make group work effective as well.

Among the aforementioned factors, a better course design and instruction, well considered grading and evaluation method are absolutely what teachers can do to make a positive influence on the group work learning. Language proficiency is not likely a factor that the teachers can make a influence. The factor of having group members from multi-cultural background may have positive or negative impact if the teachers influenced differently [1]. Therefore, it is important for the teachers to understand which factors are influenceable by the teachers and what the teachers can do to influence.

The aim of this literature review study is to identify the teacher-influenceable factors, either direct or indirect, that are important for the group work learning of students. The outcome, will be presented as identified factors and the discussion of their impact and inter-correlation, are not meant to tell what should teachers do, but to present what have been explored, which factors have been tried on influencing by using what methods. So that the teachers can have an insight on what could be done to avoid in advance or influence during the process to make the group work learning process to be effectively functional as expected.

The rest of this paper is structured as follows. Section 2 introduces some of the concepts that closely related to this study. Section 3 presents the literature review method. The results alone with discussions are presented in section 4. The paper is concluded in section 5 with discussion of the aware limitations and potential risks of this study.

2 Background

Group work is not just assign a few students into a group to finish an assignment. Students are expected to develop many different abilities during the group work learning. A plenty of studies have been done in the higher education pedagogy research field that relate to the improvement of student group work based learning.

Casual interaction, cooperative learning or collaborative learning, and Team Based Learning (TBL) are classified by Fink as three types of using groups in higher education [17]. Casual interaction is a type of short interaction between students during lectures. It can be happened that the students discuss and share thoughts and answers with neighbor students after the teacher asked a question during a lecture [18].

Many studies has demonstrated the benefits of cooperative learning [19], including motivating [6], responsibility building [7], and critical thinking stimulating [20]. In addition, students' positive interdependence, individual accountability, social skill and group processing ability could also be promoted with cooperative learning [8].

There are also a big amount of studies reported the benefits of collaborative learning, where the benefits to the students are similar to the benefits of cooperative learning [14]. Collaborative learning is a term that sometimes used interchangeable to cooperative learning. However, there are differences mentioned between them, where collaborative learning is more of students making progress independently within the group. There is also a definition that cooperative learning is a structured type of collaborative learning, where students making progress interdependently

to achieve mutual goals [14]. So that collaborative learning becomes an upper type group based learning of cooperative learning and TBL.

TBL was originally constructed by Michaelsen, Knight and Fink in the 1970s [21]. What TBL differs from cooperative learning or collaborative learning are the interaction, interdependency, cohesiveness, accountability, shared responsibility and the time period that the members working together [17, 18].

As there are a plenty of studies on group work learning, there are also literature review studies that investigate on different perspectives. The topic of the review study performed by Riebe, Girardi and Whitsed is very close to this review. They tried to identify the factors in academic publications that are perceived to afford or constrain teamwork pedagogy in higher education [3]. The identified transaction costs are temporal, fiscal and human resource, which are considered to contraint the application of teamwork education. They also identified influencing factors range from curriculum design to team composition. However, they didn't investigate or discuss what can instructors do to influence those factors.

3 Method

As a method to obtain an overview of prior research regarding a topic, literature review was used to investigate the factors that have been already studied [22]. ERIC database was used as the main source, Google Scholar was used for supplementary search. Firstly, initial article search and review were performed together with thesaurus search to formulate the search keywords. Thorough database search was then be performed to identify relevant articles.

3.1 Inclusion/exclusion criteria

The included articles have to be published and indexed by database before the March of 2019, since the review study started in March 2019. We considered only peer-reviewed journal articles for the purpose of keeping a high quality standard for this review. We also excluded articles not written in English and duplicated publications of the same study that have been already included. The following inclusion and exclusion criteria were also applied to screen articles to keep the study focus on the topic.

Inclusion at least one of the following criteria is fulfilled

- Articles investigating one or more factors relate to students' group work learning experience.
- Articles investigating one or more factors relate to students' group work learning outcome.
- Articles investigating one or more factors relate to students' perception towards group work learning.

Exclusion any of the following criteria is fulfilled

- Article's study is a quantitative research but does not manipulate or has no comparing group for any factor.
- Article's study is only investigating the effects or benefits of group based learning.

- Article' study is not on the higher education level.
- The study aims at online or remote education.

3.2 Process

Figure 1 shows the process of the literature search and screen. As aforementioned, several rounds of initial article searches (performed in ERIC database and Google Scholar) and thesaurus search were performed to help formulating search keywords.

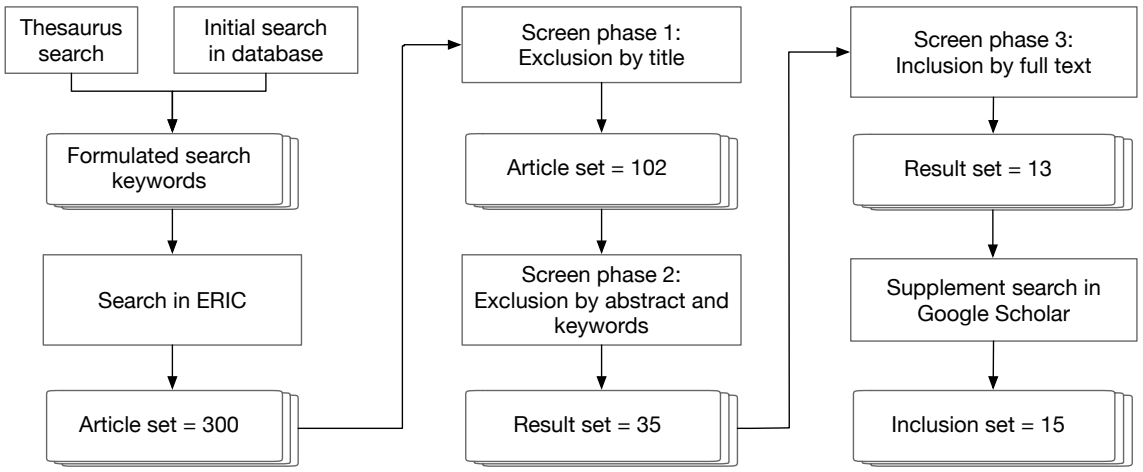

Figure 1: Flow chart of the literature review process

With the formulated search keywords, 300 peer reviewed journal articles were found in ERIC database. The search string used is a combination of the following parts:

group work ("group work" OR "group project" OR "team work" OR "team project" OR "group-work" OR "groupwork" OR "teamwork" OR "team learning" OR "team based learning") AND

teacher influence ("factor*" OR "effect*" OR "contraint*" OR "restrict*" OR "affordance*" OR "benefit*" OR "interfere*" OR "impact*" OR "affect*" OR "influence*")

role condition ("teacher" OR "instruct*" OR "educat*") AND ("student")

exclude remote education -descriptor:("online learning" OR "online education" OR "remote learning" OR "remote education" OR "distance learning" OR "distance education")

scope +educationlevel:"higher education"

Terms including team based learning, cooperative learning and collaborative learning have been used in the initial searches with the above combination. However, there were no difference to the search results.

A 3-phase article screening was then performed to screen relevant articles to the inclusion article set.

Phase 1 Performed on the article set from ERIC database search results, to exclude articles that are absolutely irrelevant based on inclusion and exclusion criteria by reading the titles. As this is an exclusion screening process, which means an article will be excluded only if it is sure that the title tells the article is talking about a totally irrelevant topic.

Otherwise, the article will be kept to the next phase. 102 articles were kept in the article set after this phase.

Phase 2 Performed on the article set from phase 1, to exclude articles that are irrelevant based on inclusion and exclusion criteria by reading the titles, abstract, keywords. 35 articles were kept in the article set after this phase.

Phase 3 Performed on the article set from phase 2, to include articles that are relevant based on inclusion and exclusion criteria by looking into full text. The result article set of this phase is the final inclusion article set. 13 articles were kept in the article set after this phase.

To avoid the omission of relevant articles that are not indexed by ERIC database, a supplement search in Google Scholar was performed by using a similar keywords combination. The first 100 articles by relevance of the search results were screened with the same 3-phase process. 2 articles were included to the inclusion set, which makes the number increased to 15.

4 Result

4.1 Included studies

Finally 15 articles are identified as relevant. Some of the studies investigated more than one factor. Table 1 lists all the included studies with their research design and limiting conditions. 3 studies were performed on multi-disciplinary subjects or courses. The limiting condition indicates that a certain study's validity or generality is limited by that condition of study. A summarized finding of each included study is listed in Table 3 in Appendix. Figure 2 presents the type of research method used by the included studies. We can see that the majority of studies performed quantitative research method or a combination of quantitative and qualitative methods, only 1 study performed only qualitative study.

Table 1: Included studies

ID	Subject area	Research design	Limits
[23]	Business	Quantitative; N=140 students; 2 semesters	1 course
[24]	Software Engineering	Quantitative; N=327 students; 5 semesters	1 subject, unbalanced gender distribution
[25]	Finance	Quantitative+Qualitative; N=69 students; 3 classes	1 subject
[26]	Multi-disciplinary	Qualitative; N=6 students	Limited participants
[27]	Computer Science	Quantitative+Qualitative; N=50 students	1 course
[28]	Writing	Quantitative+Qualitative; N=40 students; 2 semesters	1 course
[29]	Finance	Quantitative; N=500 students; 5 semesters	
[30]	Biology	Quantitative+Qualitative; N=47 students;	
[31]	Psychology	Quantitative; N=187 students	1 course

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ID	Subject area	Research design	Limits
[32]	Multi-disciplinary	Quantitative; N=359 students; 11 instructors; 17 courses	
[33]	Business	Quantitative; N=155; 2 courses	
[34]	Business	Quantitative; N=88 students; 3 sections	1 course
[35]	Multi-disciplinary	Quantitative; N=243 students;	
[2]	Actuarial science	Quantitative; N=290 students; 3 semesters	1 course
[14]	Sociology	Quantitative; N=101 students	1 course

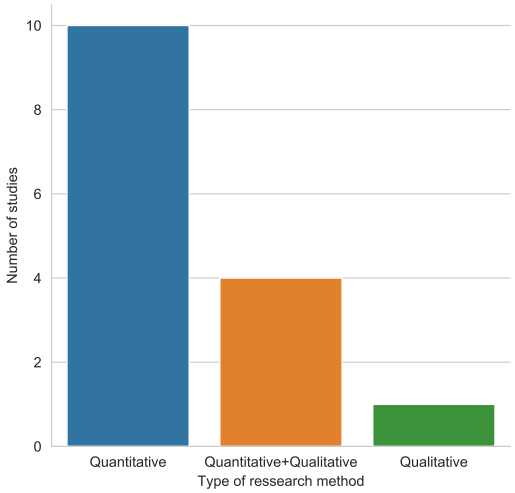

Figure 2: Type of research method

4.2 Factors

Table 2 lists the 15 identified factors from the included articles. These factors are directly extracted from the included articles. Some of the factors are synthesized and abstracted to have better representation without altering its original meaning. The 15 factors are grouped in to 5 categories by their similarities and the sources of problem. The 5 categories are *group formation*, *group dynamics*, *individual*, *assessment* and *instruction*, which is inspired by the study [3]. Many of the factors are inter-related, i.e., one factor could be influenced by influencing certain other factor. And factors between groups are not totally separated, e.g., the factors in the *individual* group is of course highly related to the factors in the *group dynamic*.

What needs to be noted is that a factor listed in Table 2 does not mean that it has been proven to be influenceable or effective, but has been investigated in a study on trying to influence. The *Impacted* column contains the parts of learning that could be impacted by a factor and investigated in the included studies. The *Influence* column indicates if a factor could be directly or indirectly influenced by instructors according to the included studies and analysis.

4.2.1 Group formation

How a group is formed directly relates to how would the group perform on the task. And it also can be controlled by instructors directly. The study performed by El Massah [25] finds that majority of students prefer to form groups by their own affinities, rather than to be randomly

Table 2: Factors by group

Factor group	**Factor**	**Impacted**	**Influence**	**Study**
Group formation	Group forming method	experience; perception	direct	[25, 27, 24]
	Gender difference	process; performance	direct	[24]
Group Dynamics	Team charters	process	direct	[34]
	Group motivation	performance	indirect	[29]
	Group instability	performance	indirect	[29]
Individual	Free rider	experience; perception; process; performance	indirect	[25, 14, 26]
	Peer accountability	experience; process	indirect	[28]
	Perception and attitude	process; performance	indirect	[30]
	Learning style preference	performance	indirect	[23]
Assessment	Evaluation method	satisfaction; process	direct	[31]
	Peer evaluation	satisfaction; perception; process	direct	[25, 35, 14, 29]
Instruction	Instructional design	perception	direct	[28, 31, 2]
	Insturctor assistance	performance	direct	[33]
	Instructor training	performance	direct	[32]
	Activity tracking	process; satisfaction	direct	[25]

grouped or grouped based on skills. However, the students formed group is not considered as a preferred way from the instructor's view. A study shows that strangers in a group may perform better than acquaintances on the group work [36]. And it may also hinder the instructors from having accurate assessments, for example tracking the free riders, which will be discussed later.

Kyprianidou et al. investigated the impact of group formation based on students' learning styles [27]. They developed a Web system named PEGASUS to let students identify their learning styles and then assign them into heterogeneous groups. This study provides an evidence that group formation based on students' learning styles has a positive effect on students group work, and the adoption of learning style theories can facilitate automated group formation. The results revealed that the students were benefited since the heterogeneity of learning styles within the group emphasized complementarities and pluralism in students' ways of thinking.

Another group formation model that takes account of students preferences and teacher's considerations was proposed by Sahin [24]. The 3 years long study shows that the proposed model is better than random selection, teacher selection and student selection in terms of group project grades.

Another interesting result in Sahin's study is that the gender difference in groups is found having negligible effect on group's performance and activities [24]. However, the validity of the result is limited since the study was performed only in one Software Engineering course, where male students are far more than female students.

4.2.2 Group dynamics

A good dynamics is very important for a group to function well on the tasks. 3 factors investigated in 2 studies are found to be classified in this factor group. The study finds that the introduction of team charters can improve the process outcomes of group work including communication effort, mutual support, cohesion and member satisfaction [34]. The introducing of team charters can provide common references for disagreements and decision making, issues such as operating guidelines, behavioral norms and performance management could be addressed. This could be suggested by instructors when forming groups, provided with some practice examples. It could benefit either groups formed by either acquaintances or strangers.

The results of the study performed by Koppenhaver and Shrader [29] suggest that the partly instructor controllable factors group motivation and instability are particularly important to a group's performance. They suggest that group activities should be significant on its weight for grading, and peer evaluations should be used and graded, to encourage and also ensure the work will be done in the form of a group. They also found that the diversity of personality characteristics in groups can mitigate the impact to performance due to group instability.

4.2.3 Individual

As a group is formed by individuals. The differences among individuals usually impact how does a group function. Free rider is regarded as a serious threat to the students' group work-based learning and unable to be directly influenced by instructors [25]. Various methods have been tried to mitigate the negative impact of free riders, including non-self forming groups, peer evaluation, activity tracking and so on. However, many of the studies reported that it is difficult to totally eliminate free riders. As aforementioned, students preferred to form groups according to their own affinities, which results in students are not inclined to report their friends' free

riding. Consequently, instructors cannot rely upon peer evaluation to distinguish free riders [25].

Similarly, the study performed in [26] also reported that it is not able to eliminate free riders due to reasons including looseness of group formation, special bond of group members, lack of group activities supervision and students varies workloads. However, the results in [14] show an interesting point that groups with free riders did not submit significantly lower quality work than the groups without free riders. Free riders do not depress the grades of non-free rider students.

Peer accountability is not able to be directly influenced by instructors as well, but it could be positively influenced by implementing collaborative learning, which is also related to the instructional design and instructor assistance [28]. The factor of students perceptions and attitudes is another one that seems not able to be influenced by instructors. However, the misconception on the objectives of group work and the attitudes of perceiving group work as a means of getting passed [30] can be adjusted by the instructor's well-motivated guidance and appropriate activity design, which also relate to other factors.

The aforementioned group formation method based on students' learning styles can have a positive effect on students group work [27]. The learning style preferences is a also individual factor that will impact an effective group work learning. The influence of this factor varies with educational experience, gender and major [23]. Learning style of a higher education student is hard to be influenced in a short time in order to fit for the group work, but as mentioned, instructors can utilize the variety of learning styles to form groups to further improve the group work effectiveness [27].

4.2.4 Assessment

A number of studies reported that evaluation method relates to students' satisfaction and performance, especially the using of peer evaluation. Peer evaluation is suggested to be used to emphasize the weight of group activities for increasing group motivation [29].

In the study performed by Zedda et al., 187 psychology students were divided into 3 cohorts with 3 different evaluation methods for the group performance, which are overall teacher's evaluation, overall teacher's plus peers' evaluation, and two teachers' plus peers' evaluation [31]. The results indicate that the students preferred that evaluation methods that take account both teacher's and peers' evaluation.

The results of the study by Planas-Llado et al. also indicate that the students, 243 students from 6 subjects including social sciences, science and engineering, regarded peer evaluation as positive [35]. It also finds that it is very important to explain the evaluation process with guidelines to the students before the peer evaluation activity. The teachers' and students' prior experience in peer evaluation are also important for the successful use of peer evaluation.

However, there are something needs to be kept in mind. The overall assessment method should be designed carefully, especially for the weight of peer evaluation in the total course evaluation. Because students' peer evaluations may not correlate with their course performance, as reported by Dingel et al. [14].

In addition, when using peer evaluation, the instructors need to have a good group formation method, rather than let students form groups by themselves. As reported by El Massah, students prefer to form groups by their own affinities, it may hinder the instructors to get accurate

assessments from peer evaluation since students may not objectively evaluate how their friends performed in the group [25].

4.2.5 Instruction

Although group work in a higher education setting is usually performed in the way of two or more students independently and collaboratively conducting a project, the instruction part is still quite important and considered direct influencing factors.

Instructional design is one of the mostly studied factors among the instruction related factors. Instructional design affects students perceptions on the group work very much. A study shows that providing the student groups with a pro-forma set of group rules to follow made significantly positive impact on the students perceptions on 3 dimensions including effectiveness, assistance and enjoyment [2]. And how much care paid by instructor on designing the pedagogy activities influences the degree of benefits that the students obtained from the group work learning [28]. When designing instructions and pedagogical activities, instructor's care paid on increasing group peer accountability and fair assessment, such as combined evaluation from both instructor and peer students, is also considered important to students' satisfaction and performance [28, 31].

Not only the instructional design affects a lot on the students group work, the assistance provided by the instructors can also affect in different ways. The results of the study by Swaim and Henley indicate that the instructor's collaborative assistance and the rational persuasion demonstrated by the instructor have an impact on student's value placed on the group work, which further affect the group project goal commitment [33]. Where instructor's active involvement such as offering suggestions may not have direct effect, while the logical and persuasive motivation on the benefits of working as a group can have more direct effect.

As instructors have direct impact on students' learning and development of group working skills, therefore, it is extremely important for the instructors having sufficient knowledge on instructing group-based work for students, especially when students lacking experience on group work. The study performed by Burbach et al. demonstrates that the training to the instructors on effective use of group work can have a significant impact on student group work knowledge, skills and abilities [32]. Workshop on related topics, periodical peer discussion and current literature review on related topics are considered useful methods for instructor training [32].

Another factor that has been investigated can be classified as activity tracking to mitigate the impact of free riders. It is reported in the study performed by El Massah that using mobile applications can help instructors [25].

5 Conclusion

The purpose of this review was to identify the teacher-influenceable factors that are important to the students' group work based learning. 15 journal articles were found relevant through database searches. 15 factors were identified and grouped into 5 categories. Many of the identified factors are inter-correlated to each other. The 15 factors were found to be influenceable by instructors directly or indirectly. However, many of the included studies investigated certain factors in only 1 course in 1 subject area. Some of the studies found the results to be insufficient to support the conclusion, or the impact of certain factors are negligible. It indicates that more studies are required on this topic to investigate the factors in different subject areas.

This review study is a small scale initial investigation of existing research. Therefore, there exists potential risks and limitations. Although initial search and review were performed to formulate database search string, certain related concepts and terms might still be left out to the database searches. The first phase of the article screening was performed as excluding irrelevant articles by reading titles. It may still cause relevant articles being screened out, though this screening phase tended to remove only articles that whose titles are thought to be totally irrelevant. The extraction and grouping of factors are not a perfect and clearly separated mapping, which could leave confusion and indistinction to the readers.

Appendix

Table 3: Findings of included studies

ID	Finding
[23]	The students' collaborative orientation complements participation and helps to compete, which increases team performance. The inuence of learning style varies with educational experience, gender and major.
[24]	The group formation model proposed in the study is found better than random selection, teacher selection and student selection in terms of group project grades. It also finds the gender difference in group has negligible effect on group performance and activities.
[25]	Students still have positive views on group work despite the presence of free riders, but prefer to form groups by theirselves. Peer evaluation is found unreliable. Free rider is regarded as a serious threat and calls for actions and strategies from institutions and instructors. The study points out that mobile applications can help instructors to mitigate free riding.
[26]	The study concludes that it is not able to eliminate free riders due to reasons including looseness of group formation, special bond of group members, lack of group activities supervision and students varies workloads.
[27]	The study provides an evidence that group formation based on students' learning styles has a positive effect on students group work, and the adoption of learning styles theories can facilitate automated group formation. The results revealed that the students were benefited since the heterogeneity of learning styles within the group emphasized complementarities and pluralism in students' ways of thinking.
[28]	The study finds that the degree of peer accountability in the group and the instructor's care in designing the pedagogy activities influenced the degree of benefits that the students obtain from collaborative learning.
[29]	The results of the study suggest that group motivation and instability are particularly important to a group's performance. Group activities should be signicant on its weight for grades, and peer evaluations should be used and graded. The diversity of personality characteristics in groups can mitigate the impact of group instability.
[30]	The result of the study indicates that the students had misconception on the objectives of group work, and they perceived group work as a means to pass the task rather than to study collaboratively.
[31]	The findings of the study show that group work learning method increased the students' satisfaction. The students preferred performance evaluation method that takes account both teacher's and peers' evaluation.

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ID	Finding
[32]	The study demonstrates that the training to the instructors on effective use of group work had a significant impact on student group work knowledge, skills and abilities, based on the pre and post-test scores of 359 students.
[33]	The results of the study indicates that instructor collaborative assistance and rational persuasion demonstrated by instructor have an impact on student value placed on group work, which further affect the group project goal commitment.
[34]	The study finds that the introduction of team charters improved process outcomes of group work including communication effort, mutual support, cohesion and member satisfaction.
[35]	The study finds that it is impotant to explain the assessment process with guidelines to the students before the peer evaluation activity. The teachers' and students' prior experience in peer evaluation are the main factors influencing the evaluation and perception of group work. The students regarded peer evaluation as positive.
[2]	The study explores factors, including instructional design regarding provided scaffolding, expectations and roles in the group, that influence student perceptions of group work on 3 dimensions including effectiveness, assistance and enjoyment. Providing groups with a pro-forma set of group rules to follow made significantly positve impact on student perceptions.
[14]	The results show that groups with free riders did not submit significantly lower quality work than the groups without free riders. Free riders do not depress the grades of non-free rider students. The students' peer evaluations do not correlate with their course performances.

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