

Student perceptions on the influence of the type of assessment of collaborative learning on behavioral patterns

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Abstract

The use of collaborative learning in higher education has increased in the last decades. Collaborative learning is associated with behavioral patterns (i.e., free-riding, social and collaborative loafing, and the sucker effect), which often occur during collaboration, and are related to the type of the assessment, while they hinder the collaborative learning process. This study examined the perceptions of students on the influence of the type of the assessment and the reason behind free-riding on behavioral patterns. A questionnaire including vignettes, self-constructed Likert scales and open-ended questions was used to gather data from undergraduate and undergraduate students from Dutch universities and the study adopted a mixed-methods design. Analysis included open axial and selective coding for the qualitative data, and descriptive statistics and MANOVA for the quantitative data. The quantitative analysis revealed no statistically significant multivariate main effects of free-riding reason and type of assessment on social loafing and collaborative loafing. The qualitative results showed that the occurrence of behavioral patterns is a common phenomenon that influences the motivation and behavior of students in relation to collaborative learning. The findings suggest teachers to take into account students' prior collaborative experiences in relation to the elements of collaborative learning, when designing collaborative assignments.

Keywords: collaborative learning, behavioral patterns, free-riding, social loafing, collaborative loafing, the sucker effect, higher education

Student perceptions on the influence of the type of assessment of collaborative learning on behavioral patterns

Collaborative learning is associated with numerous benefits, and in the last decades has taken a significant place in higher education curricula (Laal & Ghodsi, 2012; Meijer et al., 2020). Laal and Ghodsi (2012) summarize and categorize the benefits of collaborative learning in four main categories: social benefits (e.g., development of a social support system), psychological benefits (e.g., collaboration is associated with reduction of anxiety), academic benefits (e.g., active participation in the learning process), and alternative student and teacher assessment techniques (e.g., collaborative learning enables the ability to use different assessment techniques). In the literature, there are several terms that refer to students working together, but in line with Strijbos (2016) 'collaborative learning' will be used and defined as:

a learning phenomenon where individuals in a social constellation (e.g., group, team, or community) within a physical and/or virtual environment, interact on the same or different aspects of a shared task to accomplish implicit or explicit shared and individual learning goals (e.g., domain-specific knowledge or skills, social skills, etc.). Collaborative learning is structured by collaboration scaffolds (which can be faded if no longer needed) provided by an agent(s) within or outside of the social constellation (e.g., teacher, peer, self, technology) to guide interaction and increase the likelihood that social constellations and/or individuals can accomplish their goals. An agent(s) within or outside of the social constellation diagnoses and/or evaluates the constellation's and/or individual's accomplishment(s) against criteria and standards (Strijbos 2016, p. 302).

Collaborative learning has proved beneficial in several ways, since it can support the attainment of knowledge and skills embodying high-order thinking (e.g., critical thinking)

and metacognitive skills (e.g., self-regulation) as well as assisting with the development of prosocial behavior (e.g., empathy, helping others) (De Hei et al., 2018). The reasons behind the use of collaborative learning by teachers can be multifaceted, but can be categorized in two broad strands: didactic reasons (i.e., cognitive, social and/or motivational skill development) or pragmatic reasons (i.e., decreased time needed for teaching and grading students) (Meijer et al., 2020).

Despite the benefits of collaborative learning and several studies supporting teachers to implement it in the classroom (Burke, 2011; De Hei et al., 2018; Strijbos, 2011), teachers still consider the design and implementation of collaborative learning in higher education as challenging and complicated (de Hei et al., 2015). Collaborative learning might not lead to the expected learning objectives, which are either cognitive (e.g., knowledge), social (e.g., communication skills) and/or motivational (e.g., attitudes) (Meijer et al., 2020; Strijbos, 2011, 2016). Additionally, students can show decreased investment of mental effort and loafing behaviors, which undermine the learning process (Voyles et al., 2015). Consequently, it is evident that collaborative learning is not always functioning in the expected and desired manner (Salomon & Globerson, 1989). Aiming to help teachers, De Hei et al. (2016) constructed the Group Learning Activities Instructional Design (GLAID) framework, which is comprised of eight elements: (1) interaction, (2) learning objectives and outcomes, (3) assessment, (4) task characteristics, (5) structuring, (6) guidance, (7) group constellation, and (8) facilities.

Furthermore, there are two significant principles in relation to collaborative learning, namely individual accountability (i.e., the extent to which students individually are responsible for input into collaborative learning) (Slavin, 1980) and positive interdependence (i.e., the degree to which the performance of each group member relies upon the

performance of the rest of the group members) (Johnson, 1981). In particular, these principles are associated with productive interaction during collaboration and were introduced in order to counterbalance social loafing and free-riding (Strijbos, 2016); two behavioral patterns that often occur during collaboration. The element of communication, which is a focal part of collaborative learning, plays a major role in the development of the interdependence of cognitive and behavioral patterns among the group members to the extent that effort (or effort avoidance) becomes mutual and reciprocal (Salomon & Globerson, 1989). Therefore, considering a group as a social system, the behaviors and cognitions that emerge become interdependent, and the reciprocity of this interdependence grows over time (Salomon & Globerson, 1989). This means that the cognitive processes and behaviors of each individual in a group depends on the individual cognitive processes of the rest of the group members and vice versa (Salomon & Globerson, 1989).

Behavioral Patterns

Behavior can be affected by the rules of collaborative learning (i.e., design of activities and assessment) and lead to different interaction patterns and outcomes than what was expected by the teachers (Pitt, 2000). This also implies the violation of the two aforementioned principles in relation to collaborative learning (i.e., positive interdependence and individual accountability) (Strijbos, 2011). For instance, students might divide the tasks based on their abilities, in order to maximize the possibility of a satisfactory grade and this can result in limited understanding and knowledge of the learning material as a whole (Pitt, 2000, Kagan, 1995). This might be due to a misalignment between the teacher objectives and the design of collaborative learning (Meijer et al., 2020).

During collaboration teachers and students often encounter issues, such as free-riding (De Hei et al., 2018; Strijbos, 2011), social and collaborative loafing (Bacon, 2005;

Strijbos, 2011), and the sucker effect (Kerr, 1983). First, the sucker effect is defined as a phenomenon that occurs in collaborative situations when some group members believe that they are more productive, while other members might free-ride (Kerr, 1983). It is worth noting that even if the sucker effect can be avoided, either because the most capable group members believe that the rest of the group members are capable but do not expend their fair share of effort or due to lack of skills, the team members become inattentive and the group shows lower performance than it could show (Salomon & Globerson, 1989).

Second, free riding occurs when one or several members of the group devote(s) decreased amounts of mental effort assuming that the work will be completed by the rest of the group and still shares the benefits (Salomon & Globerson, 1989; Strijbos, 2011), while social loafing arises when group members tend to invest less effort in comparison to when working on an individual task (Latane et al., 1979). Social loafing and free-riding are often related to disappointing experiences regarding the assessment of collaborative learning in terms of fairness (Strijbos, 2011), especially in case the final grade is based exclusively on the group grade. In particular, social loafing is related to a phrase “many hands make the work lighter” and has both positive and negative connotations (Latané et al., 1979, p. 1). On the one hand, it implies that individuals can reach their target easier through collaboration, whereas, on the other hand, individuals devote less effort when working in a group with more people (Latané et al., 1979). Individuals tend to put more effort into tasks that they are held accountable for and there are several factors that play a role in why people decide to decrease their level of effort (Aggarwal & O’Brien, 2008). For instance, students might feel afraid to express their incompetence or lack of understanding (Webb, 1997). However, studies on social loafing reveal that as the group size becomes larger the tendency of individuals to put less effort increases as well (Bacon, 2005; Latané et al., 1979). Colbeck et

al. (2000) found that a percentage of students exceeding 40% mentioned having loafers (students who invest less effort than they ought to) in their groups.

Lastly, according to Bacon (2005) collaborative loafing is defined as “the division of the work by the students in a manner that allows them to apply the skills they are already comfortable with and thereby find a path of least resistance to a satisfactory grade” (p. 254). The successful division of work contributes to students’ satisfaction, since they seem to approximate the teacher’s expectations (Bacon, 2005). It is worth clarifying that the main difference between social and collaborative loafing is that the latter is based on a decision that the group makes towards a better performance, while social loafing is a tendency to reduce effort when in a group of many individuals. The occurrence of social loafing and collaborative loafing during collaborative learning might imply that not all the students will work on all of the tasks, hence the possibility for several students to miss some of the learning opportunities becomes higher (Bacon, 2005). However, this is not always a problem per se and it might depend on the learning objectives. Despite the fact that the students might feel satisfied with their achievement, the teacher might not be able to recognize that the students gained little new knowledge and made little use of new learning tools, but instead they went once again through the previous mastered knowledge and tools (Bacon, 2005). Walker (2001) found that undergraduate psychology students consider free-riding and social loafing as a matter of deep concern during collaboration.

There is a plethora of strategies that could be used to minimize social loafing, such as jigsaw classroom structure (i.e., a method of organizing collaborative assignments, with each student assigned the role of an expert in a particular section of their collaborative assignment) (Voyles et al., 2015), peer evaluation (i.e., group members provide constructive feedback to each other, in order for each member to be held accountable for a task and use

the feedback to improve the work) (Aggarwal & O'Brien, 2008), the diary method (i.e., groups or group members regularly record their tasks, accomplishments, and problems that arose during collaboration) (Dommeyer, 2007), and keep logs of online collaboration (i.e., a web system for recording students' interaction and peer evaluations) (Brandyberry & Bakke, 2006). Despite minimizing the occurrence of social loafing, these strategies could enable the opportunity to succeed for students who contribute to the collaborative learning without being influenced by the performance of the free-riders and loafers (Freeman & Greenacre, 2011).

Assessment

Assessment is also a focal point in relation to the way students behave throughout collaborative learning along with the learning process (Parsons & Drew, 1996), but is one of the least explored issues with respect to collaborative learning (Strijbos, 2011). Assessment is of major importance, since it works as a motivator and is used in the majority of the structures of collaborative or individualistic learning (Pitt, 2000). It also affects the learning process, since unfairness of the assessment leads to unmotivated students and draws the attention from the subject of interest and the development of skills, and, hence, the quality of collaborative learning decreases (Parsons & Drew, 1996). In addition, assessment plays a significant role in relation to the manner that students operate in groups (e.g., division of work and collaboration between members) (Pitt, 2000; Parsons & Drew, 1996). The assessment can be either summative (i.e., usually occurs at the end of the learning process and flows into the final grade) or formative (i.e., typically happens during the learning process and does flow into a final grade and is used to advise students during the learning process) (Strijbos, 2016). The extensive use of collaborative learning leads to the important question of how collaborative learning should be graded, if it should be graded at all

(Hoffman & Rogelberg, 2001). Given the under-exploration of assessment of collaborative learning along with the existing struggles with its design and use, teachers express concerns as regards to decision making for its assessment as well as its alignment with other important components of collaborative learning such as interaction, task characteristics and guidance (De Hei et al., 2015; Meijer et al., 2020). Moreover, the method of assessment of the collaborative process(es) and/or product(s) may vary. The most commonly used methods are group assessment (i.e., grades focused on the group level), individual assessment (grades focused on the individual level), and combined assessment (i.e., a combination of group and individual levels) (Meijer et al., 2020; Strijbos, 2011).

However, there is contradicting evidence regarding the most suitable method for assessing collaborative learning. Kagan (1995) argued that group grades are unfair, undermine motivation and violate individual accountability. In addition, individual assessment is found to reduce social loafing, whereas group grades are associated with better collaboration (Hayek et al., 2015). Meijer et al. (2020) discusses that group assessment might indeed enhance genuine interaction and collaborative skills for all group members, but might also elicit unwanted student behaviors, such as free-riding and the sucker effect. This is possible for both formative and summative assessment; however, a performance-oriented approach is more likely for summative assessment, since the outcome is of major interest for students (Meijer et al., 2020). Collaborative loafing might be related to a performance oriented-approach. According to Pitt (2000), a performance-oriented approach is defined as the most favorable strategy that is used by students in order to achieve the best possible performance by dividing the tasks based on each group members' best skills. The group tasks are assigned to each individual and are combined again at the end. The division of work helps students to perform at their best, while also choosing the path of least resistance and effort (Meijer et al., 2020). However, despite the misalignment between the learning

objectives of collaborative learning and the adoption of a performance-oriented approach, students also gain little knowledge by collaborative learning (Meijer et al., 2020).

Furthermore, although individual assessment might mitigate problems like free-riding and the sucker effect, group members are also more likely to develop antagonistic feelings towards each other, since students who care more about their performance might be in conflict with low achievers, who are only interested in a passing grade (Meijer et al., 2020). The problem that arises is that there might be a misalignment between the goal of collaborative learning that teachers were aiming for, and, among other factors, the assessment of collaborative learning itself; particularly in case the aim is the development of collaborative skills and empathy. Moreover, in case the tasks do not foster collaboration of students, it might be possible for the collaborative assignment to become, more or less, an individual assignment (Meijer et al., 2020).

In conclusion, it seems that combined assessment might be the ideal scenario for the assessment of collaborative learning and counterbalance the problems that are created by group and individual assessment. This approach is used as a 'corrective' in order to minimize the potential for social loafing and free-riding that group grades might bring (Strijbos, 2016). However, a challenge emerges when a group task(s) is accompanied with an individual task(s) and the assessment is based on the final grade that consists of the average with a weighting factor applied (Strijbos, 2011). First, adopting this approach assumes that individual tasks are a clear representation of the individual contribution to the group task and it counteracts for possible lack of effort and quality of collaboration during the group task (Strijbos, 2016). This approach could minimize the likelihood of behavioral patterns that arise when the final grade is based solely on the group grade (Strijbos, 2016). The percentages of group tasks and individual tasks that will comprise the final grade in case of a

combined assignment can vary and this plays a major role in the students' experience of collaborative learning processes (Strijbos, 2016). The percentages of the final grade based on individual or group contribution can vary between 10% and 90% (Strijbos, 2016). However, there are no clear guidelines regarding the weighting factor that can be applied (Strijbos, 2016). For instance, if the final assessment is based on only 10% of the group grade, then collaborative learning is undermined while in the case of 90% free-riding and loafing are welcomed (Strijbos, 2016). For instance, underachievers might show a preference towards a higher percentage based on group contribution (Strijbos, 2016), and this could result in negative experiences with group grades that would influence students' perceptions towards collaborative learning (Hoffman & Regelberg, 2001).

Present study

The present study will focus on the elicited student behavior of group assessment and combined assessment according to students' perceptions. There is a need to investigate the numerous factors that are involved in collaborative learning processes and especially, their developing reciprocal influences (Salomon & Globerson, 1989), since to our knowledge there is no previous work that examined the occurrence of behavioral patterns such as free-riding, social and collaborative loafing and the sucker effect in higher education in relation to group and combined assessment. Since individual assessment is found to reduce the likelihood of behaviors such as collaborative loafing, social loafing, sucker effect and free-riding, (Meijer et al., 2020), group and combined assessment are deemed as more relevant for the purposes of this study. The reason behind this is that it explores the aforementioned behavioral patterns in relation to the assessment of collaborative learning, which appear in the literature to be highly associated with group assessment (Meijer et al., 2020; Bacon, 2005) and is also one of the two main elements of combined assessment.

There are two research questions that this study attempts to answer in relation to behavioral patterns and the type of the assessment according to students' perceptions:

1. What kind of behavioral patterns (such as social and collaborative loafing, and the sucker effect) are more likely to occur given the type of the assessment (i.e., group assessment vs. combined assessment) as reflected in students' perceptions in higher education?
2. Does the reason behind the occurrence of free-riding affect one's behavior in response to social loafing, collaborative loafing and the sucker effect?

Method

Participants

The participants were undergraduate and graduate students from higher education institutions in the Netherlands. The sample consisted of 67 students currently enrolled in a bachelor (29.9%, $n = 20$) or master (70.1%, $n = 47$) program at a Dutch higher institution. The age of the participants ranges from 20 to 42 years old ($M = 24.64$, $SD = 4.13$) with 74.6% females ($n = 50$) and 22.4% males ($n = 15$), whereas one participant identified as non-binary/third gender and one participant preferred not to disclose. Most respondents' nationality was European (94.3%, $n = 63$) whereas fewer were non-European (5.97%, $n = 4$). More specifically, the majority of the respondents were Dutch (53.7%, $n = 36$). The majority were from the Faculty of Behavioral and Social Sciences (32.8%, $n = 22$), followed by the Faculty of Economics and Business (31.3%, $n = 21$), and 35.9% ($n = 24$) of the participants study at various faculties.

The participants were approached through student networks, Facebook groups and other social media, such as WhatsApp groups and Instagram. The online research platform SurveyCircle was also used for the recruitment of survey participants (SurveyCircle, 2022).

The research information letter that was provided to the participants at the start of the questionnaire can be found in the Appendix A. The students were informed about the research at the start of the questionnaire and asked for active informed consent (Appendix B).

Table 1*Sociodemographic Characteristics of Participants*

Characteristic	N	%
Level of Education		
Bachelor Level	20	29.9%
Master Level	47	70.1%
Gender		
Male	15	22.4%
Female	50	74.6%
Non-binary/third gender	1	1.5%
Prefer not to disclose	1	1.5%
Nationality		
European	63	94.3%
Non-European	4	5.97%
Faculty		
Faculty of Behavioral and Social Sciences	22	32.8%
Faculty of Economics and Marketing	21	31.3%
Other	24	35.9%

Design and procedure

The questionnaire is combined with vignettes, open ended questions and closed-ended questions as well; hence the study consists of a mixed-methods study design, in order to understand the phenomenon under investigation better and more thoroughly through mixing different perspectives and meanings (Dingyloudi & Strijbos, 2018). The participants were asked to voluntarily complete an online questionnaire of 15-20 minutes in duration. One main vignette was constructed (i.e., a short description of a hypothetical situation) based on which four versions were created. The names that are included in the vignettes are all gender neutral. Each student received one version of the main vignette, but answered the same questions. The questionnaire was administered via Qualtrics, a cloud-based platform for creating and distributing web-based surveys, which provides the opportunity to randomize the distribution of the different versions of the main vignette. This guaranteed that each version was distributed equally often. This study adopted a factorial survey approach, since the sampling is random and a between-subjects design of vignette experiment (i.e., each respondent judges one single vignette) (Atzmüller & Steiner, 2010). All materials were translated in Dutch, since the targeted population consists of students from Dutch higher education institutions. The distribution started on the 24th of February and was completed on the 15th of April. As for the privacy and data-storage, the results of the research will be treated confidentially and pseudonymized. IP addresses were removed from the database immediately after downloading the data from Qualtrics. The data will be stored in a secure environment within the University of Groningen, in accordance with the guidelines of the General Data Protection Regulation (GDPR) and the GMW Data Management Protocol.

Materials

The primary instrument was a self-constructed questionnaire, which consisted of vignettes and closed-ended questions based on responses on a five-point Likert scale from 1 (*fully disagree*) to 5 (*fully agree*). The questionnaire also includes open-ended questions about collaborative learning experiences (See Appendix C). A reliability analysis for all the scales that were self-constructed and used in this questionnaire was performed. The criterion for the Cronbach's alpha that needed to be met was more than 0.5, since the items were less than 10 in each subscale (Glen, n.d). In order to perform reliability analysis, there were items that needed to be recoded, because they were reverse-phrased compared to the rest of the items in the same subscale, so that all items have a positive covariance between them.

Demographic Information

After indicating active consent to participate in this study, participants were presented with questions regarding demographic information. The questions requested information in relation to age, gender, nationality, level of education (i.e., master or bachelor), name of the institution that they are enrolled in, faculty (e.g., faculty of behavioral sciences) and program of studies (e.g., Master Learning in Interaction).

Instruments

First, a combination of close-ended and open-ended questions that gathered general information about collaborative learning experiences were self-constructed and preceded the vignettes and the rest of the questionnaire. Participants were asked first if they have been part of group work at the university in the form of a close-ended question. Continuing with this section, two open-ended questions followed and, in case the answer to the previous question was "yes", participants were asked to describe their previous experiences during collaboration regarding the structure of group work, the type of assessment and the degree of their involvement. Moreover, they were asked to report their experiences in relation to their

own or their fellow group members' behavior and how this influenced the collaborative process or themselves either negatively or positively.

Rating Previous Experiences

Previous collaborative learning experiences were tapped with three questions presented in the form of a matrix table which requested participants to rate their overall experience in relation to (a) the learning process, (b) the collaboration with the rest of the group members and (c) the assessment and the final grade on a five-point Likert scale from 1 (*very dissatisfied*) to 5 (*very satisfied*). An example item is "How would you rate your overall experience of group work in relation to the learning processes?". The Cronbach Alpha for the subscale *Rating previous experiences*, which consists of three self-constructed items is 0.71.

Typical Behavioral Patterns during collaboration

A set of 7 items presented in the form of statements on a matrix table gathered data in relation to the typical behavior that students used to have during collaborative learning. The responses were based on a five-point Likert scale from 1 (*fully disagree*) to 5 (*fully agree*). An example item is "I often adjust the amount of effort I devote when working together in order to focus on other assignments too." Cronbach Alpha for the Typical Behavioral Patterns subscale is 0.524.

Vignettes

Vignettes are "short descriptions of a person or social situation that contain precise references to what are thought to be the most important factors in the decision-making or judgment-making progress of respondents" (Wason et al., 2002, p. 41). One of the core assets of the vignette methodology is that it allows for the use of concrete questions distanced from personal meanings (Finch, 1987). In general, the vignette methodology is based on the idea that different versions of a main vignette will be distributed randomly to different

respondents (Wason et al., 2002). This approach was adopted in the present study, that is, one basic vignette was created from which four different versions were derived. The questions in relation to the vignettes that followed remained the same despite the version of the vignette that the participant was presented with.

Additionally, it is important that a researcher takes into account the target population and modify the vignettes accordingly (Wason et al., 2002). Since the target population of this study are bachelor and master level students, the vignettes were designed in a realistic and consistent manner in order for students to believe and relate to them. The tone of the vignette was informal and simple. Generally, gathering responses about behaviors is a sensitive and difficult research matter, but vignettes accompanied with questions provide the opportunity for responses that report behavior and tackle the complex relationship between self-reports of behaviors and behaviors themselves (Wilks, 2004). However, it should not be taken for granted that the responses to a vignette reflect the actual behavior of a respondent (Wilks, 2004), but it is considerably easier to ask difficult and personal questions in relation to behaviors, attitudes and perceptions through hypothetical scenarios.

The main vignette describes the hypothetical situation of a fictional student at a Dutch university assigned to a collaborative project, which will have a summative assessment. In this hypothetical scenario, the professor forms groups of five students and each member has its own strong assets that they bring to the collaborative assignment. However, there is one student who devotes less effort than the rest of the group members. One element that will remain consistent throughout all four versions of the vignette is a group member that free-rides for a specific reason. However, two elements will be varied in the different versions: (a) the way that the final product and the learning process of the students will be assessed (i.e., group assessment with a final group grade versus combined assessment with a final grade consisting 50% from the group part of the assignment and 50% from the

individual part of the assignment), and (b) the reason behind the free-riding by the group member (i.e., the person who free-rides receives in general good grades versus poor grades).

In the study of Wason et al. (2002), it is suggested that it would be preferable to accompany vignettes with an already developed and validated scale. However, after extensive research, such a scale was not found; hence, the construction of a scale that will meet the goals of this study was needed. Inspired by the research of De Hei et al. (2015), the closed-ended questions were specifically developed for this study. Each vignette was accompanied with one open-ended question asking the respondents how they would behave in this situation. In addition, they answered three subscales in response to the vignette, covering social loafing, collaborative loafing and the sucker effect, and each consisted of six items. Since this study investigated students' perceptions about behavioral patterns that occur during collaborative learning, these items measured the responses of students as if they were in the situation described in the vignette. Free-riding did not form a separate category because it was manipulated in the vignettes. The responses on these three scales were measured on a 5-point Likert scale from 1 (*fully disagree*) to 5 (*fully agree*) in the form of a matrix table, which allows respondents to rate a particular response. Each vignette was followed by a general question, which gathered information on how the respondents would respond to the scenario they were presented with.

Social Loafing

The first set of six items in response to the vignette was in relation to social loafing. These items measured the reduction of the effort contributed to the collaborative learning when presented with the situation in the vignette. Out of the six items, two were phrased negatively, which were recoded. An example item is "I would devote more effort in case of an exclusively individual assignment.". The Cronbach Alpha for this subscale was 0.59. One

item was deleted and this increased the alpha to 0.68. Hence, the final subscale that was used in the analyses consisted of five items.

Collaborative Loafing

The next set of six items in relation to the vignette, is related to collaborative loafing. The scale measured the division of the work in order to maximize the performance based on the best skills of the group members if faced with the situation in the vignette. An example item is “I would divide tasks among group members to guarantee a high grade.” Cronbach Alpha was 0.43. In order to meet the criterion of $\alpha > 0.5$, two items were deleted and the alpha increased to 0.509. Therefore, the final subscale of Collaborative loafing that was used in the analyses consisted of four items.

The Sucker Effect

Lastly, the last items of this questionnaire, which were also to be answered after reading the situation described in the vignette, were related to the sucker effect. Participants responded to how they would react towards the members that contribute less to the group work and the degree that this would influence their performance and motivation when presented with a situation described in the vignette. In this last scale, there was one item that was phrased negatively and was recoded. An example item is “I would reduce my own effort because I would not consider it fair to work more than one of my fellow group members.”. Cronbach Alpha was 0.16. The deletion of items did not increase the alpha enough to meet the criterion. Therefore, this scale was excluded from the analysis.

Analyses

The quantitative analyses were performed using SPSS 24. Descriptive analysis included frequencies and percentages for the independent and dependent variables, as well as the mean, SD, minimum and maximum for the dependent variables. Inferential analysis included a two-way multivariate analysis (MANOVA), since there were two independent

variables (i.e., type of assessment and reason of free-riding) and two dependent variables (i.e., social loafing and collaborative loafing). The level of significance was set to $p < .05$ (two-sided). Partial eta squared (η_p^2) was used as a measure of the effect size. Despite his initial hesitation, Cohen proposed some tentative benchmarks, where small is considered $d = |.2|$, $\eta^2 = 1\%$, medium $d = |.5|$, $\eta^2 = 10\%$, and large $d = |.8|$, $\eta^2 = 25\%$ in relation to the typicality of results for the social sciences and these would also be used as a threshold for interpreting the magnitude for the purposes of this study (Haase & Thompson, 2004). Finally, the open-ended questions that were included in this questionnaire (i.e., the open-ended questions in relation to previous collaborative experiences and the open-ended question that each participant was presented with after the vignette) were analyzed with open axial and selective coding, which allows a cyclical and evolving chain reaction by comparing and reducing data, in order to merge them (Williams & Moser, 2019).

Results

Data Inspection

The mean score for the subscale “Rating Previous Experiences” showed slight agreement ($M = 3.65$, $SD = 0.68$, $\min = 2$, $\max = 4.67$). The mean score of the subscale “Typical Behavioral Patterns” showed that they agree ($M = 3.76$, $SD = 0.65$, $\min = 1$, $\max = 5$). Continuing with the subscale “Social Loafing”, the mean score showed almost neutral agreement between the respondents ($M = 3.44$, $SD = 0.59$, $\min = 2.2$, $\max = 4.8$). Lastly, the mean score of the subscale “Collaborative Loafing” indicated that the respondents neutrally agree ($M = 3.49$, $SD = 0.56$, $\min = 2.5$, $\max = 5$).

Next, it was examined whether the mean scores for the scales “Rating Previous Experiences”, “Typical Behavioral Patterns”, “Social Loafing” and “Collaborative Loafing” were approximately normally distributed. The visual inspection of the variables’

histograms (roughly better shaped for both variables), normal Q-Q plots (dots were approximately along the lines) and box plots showed that the “Rating previous experiences”, “Typical Behavioral Patterns”, “Social Loafing” and “Collaborative Loafing” subscales were visually approximately normally distributed, but for the subscales “Rating Previous Experiences” and “Social Loafing” the median was quite high. However, since the visual inspection of the variables’ histograms, normal Q-Q plots and box plots did not provide clear evidence that “Rating Previous Experiences”, “Typical Behavioral Patterns”, “Social Loafing” and “Collaborative Loafing” were visually normally distributed, further testing via normality tests was needed in order to reach to a safe conclusion.

The Kolmogorov-Smirnov and Shapiro-Wilk tests show that Rating Previous Experiences, Social Loafing and Collaborative Loafing distribution all have a statistically significant deviation from normal ($p < .005$), with the exception of the subscale “Typical behavioral Patterns”, where the p value for the Kolmogorov-Smirnov test is 0.24. The Shapiro Wilk’s statistic value is very high for all subscales, close to 1.00, with the exception of the subscale “Social Loafing” where $W = 0.818$ (slightly lower than 0.9) and the subscale of “Typical Behavioral Patterns”, where $W = 0.69$ (lower than 0.9), so the deviation could be considered relatively low, and the variable’s distribution as normal. However, due to the fact that these two tests (Kolmogorov-Smirnov and Shapiro-Wilk tests) have a high sensitivity to the slightest deviation from normality, standardized skewness and kurtosis were calculated for each variable (Table 2).

Table 2.*Standardized Skewness and Kurtosis*

Subscale	Skewness			Kurtosis		
	Value	SE	Std.*	Value	SE	Std.*
Rating Previous Experiences	-0.942	0.293	-3.21	-0.05	0.578	-0.08
Typical Behavioral Patterns	-0.911	0.293	-3.1	2.92	0.578	5.05
Social Loafing	0.013	0.293	0.044	-0.487	0.578	-0.84
Collaborative Loafing	0.116	0.293	0.39	-0.54	0.578	-0.93

Note. SE = Standard Error, Std. Skewness = Standardized Skewness; Std. Kurtosis = Standardized Kurtosis. *They were calculated by dividing their value by their SE.

Although all four variables were a little skewed and kurtotic, each variable's skewness and kurtosis were low in absolute value (< 3) and standardized skewness and kurtosis mostly within the -3 to +3 range (Tabanick & Fidell, 2007), with the exception of the scale "Typical Behavioral Patterns", for which both the skewness and kurtosis was higher than 3. A log10-transformation was computed, which resulted in a standardized skewness almost equal to zero and a standardized kurtosis 5.19. Still the standardized kurtosis does not meet the criterion. This high kurtosis depicts that there is a limited variation of the responses, which is also explained by the slightly higher mean score of this subscale ($M = 3.76$). Finally,

Mahalanobi's distance was computed in order to identify if there were multivariate outliers for social loafing and collaborative loafing by comparing the Mahalanobi's distance values for these two variables to a chi-square distribution. There were no multivariate outliers, hence no case needed to be removed from the analysis.

Inferential Analysis

Rating previous experiences

The frequencies of this subscale revealed that the majority of the students were satisfied in regards to the learning processes during previous collaborative experiences ($n = 41, 61.2\%$), whereas 10 respondents (14.9%) reported that they were dissatisfied with the collaborative learning processes of their previous experience and one respondent (1.5%) was very dissatisfied. The other 15 students responded with neutrality. Regarding previous experiences in relation to collaboration with the rest of the group members, 38 students (56.7%) were satisfied with their collaboration with other group members, whereas 10 students (14.9%) were dissatisfied with their previous collaborative experiences with other group members and one respondent (1.5%) was very dissatisfied by the collaboration. 18 students remained neutral regarding their previous collaboration with others. Last but not least, previous experiences in regards to the type of the assessment and the final grade showed similar results, with 42 students (62.7%) reporting that they were satisfied with their assessment, whereas 7 students (10.4%) reported that they were dissatisfied. The other 18 responses were neutral. However, there was no participant who was very dissatisfied with their past collaborative experiences in relation to the type of the assessment and the final grade that they received.

Typical Behavioral Patterns

The frequencies of this scale show the typical behavior that the students had during their past collaborative experiences. First, almost half of the respondents ($n = 36, 53.8, \%$)

reported that they often adjusted the amount of effort that they devote to the group assignment in order to focus on other assignments as well, whereas a percentage of 28.4% ($n = 19$) reported that they did not adjust their amount of effort. The other 12 students remained neutral. Moreover, 40 students (59.7%) agreed with the statement that they devoted the same effort to the group assignment, despite the effort of their fellow group members, whereas 17 students (25.4%) disagree with devoting the same effort to the group assignment, despite the effort of their fellow group members. The rest of the students ($n = 10$) responded with neutrality. Regarding the division of tasks for guaranteeing a satisfactory grade, 80.6% of the students ($n = 54$) were in favor of dividing the tasks, so as to get a passing grade to the group assignment in comparison with six students (9%) that did not agree with this tactic. The other seven students remained neutral towards the division of work. Furthermore, 21 students (31.4%) noted that they adjusted their amount of effort when everyone is receiving the same grade for the assignment, whereas 40.3% of the students ($n = 27$) reported that they did not adjust. The other 19 responses were neutral. As for their motivation, 49 students (73.9%) observed changes in their levels of motivation when a group member devoted less effort than them to the common assignment, whereas eight students (26.8%) did not report motivational changes because of other group members' decreased effort. 10 students responded with neutrality to this statement. The percentage of students who reported changes in their motivation when several group members decreased their effort increased in comparison to when only one member free-rides ($n = 54$, 80.6%), whereas only three students (4.5%) disagreed with this statement. The other 10 responses were neutral. Last but not least, 49.3% ($n = 33$) reported that the group members that they depended on for the completion of the assignment met their expectations, whereas 15 students (22.4%) disagreed, which implies that their fellow group members did not meet their expectations. 19 students remained neutral regarding their fellow group members meeting their expectations.

Two-Way MANOVA for Social Loafing and Collaborative Loafing for Assessment Type and Free-riding Reason

A two-way multivariate analysis of variance (MANOVA) was conducted to investigate if there was a significant difference in social loafing and collaborative loafing for the type of the assessment (group assessment vs. combined assessment) and reason behind the free-riding of a group member (good grades vs. poor grades). Table 3 shows the descriptive statistics for the dependent variables split for assessment type and free-riding reason.

Table 3

Means and Standard Deviations for Study Variables

	SLscale		CLscale		N
	M	SD	M	SD	
Vignette					
Poor Grades x Group assessment	3.54	0.62	3.30	0.6	16
Good Grades x Group assessment	3.31	0.49	3.51	0.53	16
Combined assessment x good grades	3.56	0.65	3.66	0.58	17
Combined Assessment x poor grades	3.55	0.63	3.51	0.54	18

Note. N = 67; SLscale = Social Loafing Scale; CLscale = Collaborative Loafing

Prior to the two-way MANOVA, preliminary assumptions were tested. Shapiro-Wilks for the two levels of the two independent variables and for both dependent variables indicated that the assumption of normality is violated ($p > .05$). However, the MANOVA is reasonably robust to modest violations when the sample size is at least 20 in each cell (Tabanick & Fidell, 2007, p. 251). Mahalanobis distance was used to assess multivariate outliers; the critical value of 13.82 was not exceeded (max.value = 7.18). The assumption of linearity was satisfactory per inspection of scatterplots. The association between the dependent variables

was not significant, $r(65) = 0.11, p = 0.35$. The correlation coefficient was lower than .9; thus, multicollinearity was not a concern (Tabacknick & Fidell, 2007). The assumption of the homogeneity of variance-covariance is tenable based on the results of the Box's test $M = 4.298, F(4, 62) = 0.450, p = .908$. The results of Levene's test of equality of error variances provided evidence that the assumption of homogeneity of variances across groups is also tenable for social loafing, $F(4,62) = 0.431, p = 0.731$, and collaborative loafing, $F(4, 62) = 0.086, p = 0.968$.

The results revealed no statistically significant multivariate main effects of free-riding reason on social loafing ($F(4, 62) = 0.003, p = 0.957, \text{partial } \eta^2 = .00$) and on collaborative loafing ($F(4,62) = 1.926, p = 0.170, \text{partial } \eta^2 = 0.030$). The same applies for the assessment type on social loafing ($F(4,62) = 0.057, p = 0.812, \text{partial } \eta^2 = 0.001$) and on collaborative loafing ($F(4,62) = 1.891, p = 0.174, \text{partial } \eta^2 = 0.029$). The MANOVA yielded no statistically significant differences between the type of the assessment and the reason of free-riding on social loafing, Wilk's $\Lambda = 0.970, F(4, 62) = 0.973, p = 0.314, \text{partial } \eta^2 = 0.030$, and collaborative loafing, Wilk's $\Lambda = 0.971, F = 0.933, p = 0.399, \text{partial } \eta^2 = 0.029$. Therefore, there is no need to conduct a follow-up ANOVA.

Qualitative Results

Previous experiences of collaborative learning

The students were asked whether they have participated in collaborative learning in the past. Out of the 67 respondents, 62 indicated that they had experienced group work and were presented with two open-ended questions regarding their previous experience with collaborative learning. The first open-ended question gathered information regarding how the collaborative assignment they experienced was assessed (i.e., group grade, individual grade or a combination of individual and group grade). The collaborative assignment was evaluated with a group grade for 32 students (51.6 %) and with a combined grade for 19 students (30.6

%). Out of the 32 students that were evaluated with a group grade, 10 mentioned that peer evaluation at the end of the course counted also towards a final grade. As for the students who were evaluated with a combined grade, three students mentioned that the individual part of the grade was based on an individual report, whereas there were also six students who reported that a final examination based on individual performance played a major role in the final grade. In particular, there were also two students that mentioned explicitly the percentages of 40% for the group grade and 60% for the individual grade that comprised the final grade. There were also nine who did not explain how the group assignment was assessed. Finally, regarding their involvement in the collaborative process, only 24 students reported the degree of their involvement in the group assignment as fairly involved, whereas one student reported not being involved. The rest of the students did not comment on their involvement.

The second open-ended question gathered information regarding positive or negative influences by their own and/or their fellow group members' behavior. On the one hand, several students ($n = 28, 45\%$) reported negative previous experiences of collaborative learning due to the behavior of their fellow group members. Free-riding was one of the major problems that they met. The students became unmotivated to engage and did not complete their tasks on time, because of the free-riding of their fellow group members. However, there were also several other reasons that their experience was negatively impacted. For example, because group members were stressed and pessimistic, pressured everyone in order to get a high grade and took over the project, and did not leave enough space for everyone to contribute. Moreover, negative experiences were also related to heterogeneous groups, where Dutch speaking members of the group were communicating with each other in their native language letting everyone else feeling left out.

On the other hand, there were also students with positive previous experiences during collaborative learning. These experiences were related to good communication between the group members, sharing creative ideas and different perspectives. Furthermore, 12 students mentioned that they had both positive and negative experiences. Positives were the friendly and open environment, commitment to gain new knowledge, encouragement between the group members, taking responsibilities, acceptance and space to express themselves. Negatives they mentioned were group members that were absent, making fun of others and being dominant. Moreover, three students were not affected either positively or negatively by the collaboration with others.

Open-ended question following the vignettes

Group assessment x poor grades

There were 16 students that were presented with this scenario, where the assignment was assessed with a group grade and the free-rider received poor grades in general. Seven students (43.75 %) reported that they would split the tasks based on their best skills. Teaming up Jessie (the free-rider) with one of the other group members was suggested by some students ($n = 2$) to deal with the free-rider in their group. Out of the seven students that would divide the tasks four of them would also assign Jessie with little or no tasks (depending on whether they can complete the assignment without this group member), whereas one student would not have a problem with Jessie as long as the collaboration resulted in a passing grade. Moreover, there was one student who would still assign Jessie with a task, which Jessie should be held responsible for. Finally, one of the respondents would focus on finishing their tasks, despite the behavior of the fellow group members.

In regards to the confrontation, two students would address Jessie even if it resulted in conflict and required the involvement of the professor, whereas one student would discuss with Jessie if extra support was needed. Talking to Jessie together with one of the other group

members, such as Sammie (student with strong social skills) was also one of the responses. Finally, two students mentioned that in a master's program avoiding conflict is the best solution, because the final peer evaluation might end up with a poor grading.

Combined assessment x good grades

There were 18 students that were presented with the hypothetical scenario, where the assignment was assessed with a combination of individual and group grades and the free-rider received good grades. Nine students ($n = 9$, 56.25%) would divide the assignment into tasks according to the strong qualities of the group members. The fact that Jessie should be assigned with the same number of tasks was one of the responses. However, if Jessie did not complete the tasks, but it would be possible to get a satisfactory grade, then there would be no need for action. One of the students would be satisfied with division of work and peer evaluation that plays a role for the final grade. Teaming up Jessie with one of the fellow group members was also mentioned by one student.

There were several students that would address the problem about the lack of effort by Jessie, either on their own or with the help of one of the fellow group members. Instead, one student would prefer to discuss first with the rest of the group about Jessie's behavior and then discuss it as a group with Jessie. In case Jessie continued not to be involved, talking to the professor was also one of the possible solutions. Setting deadlines and checkpoints beforehand was also one of the responses. However, according to one of the students, the presence of only one free-rider would not have an impact on the collaborative process, since it can easily be counterbalanced by the effort of the other group members. Again, there was one student, who would focus on finishing their own tasks.

Group assessment x good grades

There were 16 students that were presented with this scenario, where the assignment is evaluated with group assessment and the free-rider received good grades in general. A

percentage of 37.5% of students ($n = 6$) would address Jessie personally and show interest in Jessie's preference regarding the tasks, while two respondents would contact the professor if everything else fails. The division of the assignment into tasks was suggested by several students ($n = 7$), while teaming up Jessie with one of the group members was again among the responses. Two of the students would divide the tasks, but would give to Jessie one of the smaller tasks. Setting strict deadlines and having checkpoints to monitor their progress was also one of the responses. Attempts to motivate the free-rider and address Jessie personally only in case of complete failure was mentioned by one of the respondents. Last but not least, in this group, there was also one student who would try their best to finish the tasks and help the team, despite Jessie's behavior.

Combined assessment x poor grades

There were 17 students that were presented with the hypothetical scenario, where the assignment was assessed with a combination of individual and group grades and the free-rider got poor grades in general. 64.7 % of students ($n = 40$) would divide the tasks based on the group members' skills. Important to note is that one of the students mentioned being aware that the division of work would not help the group grow academically and gain new skills; however, grades matter more. Setting deadlines and guaranteeing that they are met, while providing feedback to each other, were some of the responses, whereas two students would make sure that Jessie would meet these deadlines. There were also three students who shifted the focus to themselves and would work hard in order to guarantee a passing grade. Finally, two students would address Jessie by being honest about the lack of effort.

Discussion

Collaborative learning is commonly used in higher education (Jin,2012), and there are cognitive (e.g., knowledge), social (e.g., collaborative skills) and motivational (e.g., attitudes) outcomes that might be developed by its use (Strijbos, 2011). However, there are

also behavioral patterns (i.e., social loafing, free-riding, collaborative loafing and the sucker effect) that often occur during collaborative learning and might hinder the development of the desired skills (Bacon, 2005; De Hei et al., 2018; Kerr, 1983; Strijbos, 2011). In addition, the assessment of collaborative learning plays a major role in the behavior of students during collaborative learning (Pearson & Drew, 1996).

This study examined the influence of the type of the assessment in relation to the occurrence of behavioral patterns according to students' perceptions in order to provide insight into what should be considered when structuring a collaborative assignment and its assessment, so as for students to benefit from collaborative learning. Moreover, this study moves beyond prior studies by delving into the reasons behind free-riding (i.e., the grades that the free-rider usually receives) in relation to the occurrence of other behavioral patterns (i.e., social loafing and collaborative loafing).

The results suggest that the type of the assessment was not associated with the occurrence of the behavioral patterns of social loafing and collaborative loafing. This shows that there are more factors that play a role regarding the occurrence of these two behavioral patterns. For example, previous collaborative experiences might play an important role for the future behavior of students when it comes to collaborative learning (Strijbos, 2016). The qualitative results showed that students vary in their previous experiences, and therefore should also be examined in relation to the type of the assessment and their future behavior as well. Moreover, assessment is also related to other collaborative components (e.g., group constellation, guidance, task characteristics) (De Hei et al., 2016; Strijbos, 2011), and even though unfair assessment might lead to unmotivated students who divide the tasks and decreased quality of collaborative learning (Parsons & Drew, 1996; Pitt, 2000), the results do not indicate an association between the type of the assessment and the occurrence of collaborative loafing and social loafing. This shows that assessment is a multifaceted concept

and there is more to it than its assessment. Since, even though the group interaction plays a major role in relation to collaborative learning, the individual experiences of students are transferred to future collaborative assignments and this is not considered when structuring a priori the assessment of collaborative learning (Strijbos, 2016). Contrary to the hypothesized association in Meijer et al. (2020) that group assessment promotes the occurrence of free-riding, social loafing and collaborative loafing in accordance, the findings in this study suggest that there is more to the occurrence of the behavioral patterns than the type of the assessment. Despite previous collaborative experiences, as suggested by De Hei et al. (2016) the design of collaborative learning is composed of more elements, which should also be taken into account when examining the occurrence of behavioral patterns.

Regarding the reason behind free-riding, the results indicated that the grades that the free-rider receives in general are not associated with the occurrence of social loafing and collaborative loafing for the fellow group members; moreover, there is also no association in combination with the type of the assessment. The results build on the existing evidence of previous research, that is, while free-riding might be connected to feelings of inadequacy and incompetence to complete the tasks, the fellow group members consider the free-riding as intentional (Webb, 1997). The results show that the reason behind free-riding is not associated with the behavior of the fellow group members. On the one hand, this can be interpreted as supporting the previous findings by Webb (1997) that students consider free-riding as intentional and ignore the reasons behind it. On the other hand, this could also mean that students are not influenced by the free-riding of their fellow group members despite the reason behind it.

In addition, the qualitative results indicate that the majority of students are influenced by the free-riding and social loafing of the fellow group members and become unmotivated and frustrated, which is in accordance with existing evidence (Strijbos, 2011).

Division of tasks, which is associated with collaborative loafing and a performance-oriented approach (Pitt, 2000, Bacon, 2005), was reported to be employed by the majority of the students as the path with least resistance towards a satisfactory grade and reported as a solution to deal with free-riding, so that the free-rider is held accountable for their part. This builds on the existing literature on collaborative loafing, which creates a feeling of satisfaction and success to students, despite the chance of missing opportunities to gain new skills and knowledge (Bacon, 2005).

These findings are also supported by the behavior that students reported regarding their previous collaboration experiences before they were presented with the hypothetical scenarios. The majority of the students employed division of work as a strategy and adjusted the amount of effort they devoted when working together with others, and they are also disappointed and unmotivated when one or several group members free-ride. This is in accordance with the existing literature, since collaborative assignments are highly associated with free-riding, collaborative and social loafing, and the sucker effect (Bacon, 2005; Meijer et al., 2020; Pitt, 2000; Strijbos, 2011). The assessment plays a focal role regarding the behavior of students, especially when it flows into a final grade and this was depicted in the results. Most of the students reported that the behavior they would employ is due to their high interest in a satisfactory grade. The type of the assessment was not associated with social and collaborative loafing based on the quantitative analysis; however, students reported the employment of strategies and behaviors that violate positive interdependence and individual accountability due to group grades without peer evaluation (that contributes to the final grade) (Strijbos, 2011, Meijer et al., 2020). While previous research has suggested that combined assessment might counterbalance the occurrence of the behavioral patterns during collaboration (Strijbos, 2016), the results of this study demonstrate that combined assessment is not associated with decreased levels of social and collaborative loafing. However, this

supports the literature that combined assessment does not imply a clear representation of the individual contribution and should not be considered as a 'corrective' for minimizing the potential for free-riding and social and collaborative loafing (Strijbos, 2011, 2016).

Strengths and Limitations

This study was limited in a number of ways, primarily by the small sample (N=67). Given the small number of participants, there is a chance that the students who responded to the questionnaire do not reflect the general attitudes of the wider student population. Moreover, while the free-text fields provided more in-depth responses than the quantitative data alone, due to the anonymous nature of the survey it was not possible to follow up with respondents for clarification of comments made. Questionnaires do not offer the researcher the opportunity to follow up ideas and clarify issues in comparison to interviews (Beiske, 2007). It should also be noted that, despite providing respondents with a text field to provide any comments on areas of collaborative learning that the questionnaire might not have covered, all other fields were responses to particular questions. This is noteworthy as the questions would not only set the topic of the responses but also may vaguely determine the themes. While the aim was not set out to look for particular themes, these themes may already have been determined by the questions and respondents may have built their responses to following questions on the same thought as in previous questions (Bogner & Landrock, 2016).

Moreover, the items that were included in the questionnaire were self-constructed and even though the scales met the criterion, the Cronbach alphas were comparatively low, which decreases the reliability of the scales. Additionally, there was one unanticipated obstacle of this study, since one of the self-constructed scales did not meet the set criterion for Cronbach alpha. Nonetheless, the quantitative results must be interpreted with caution, due to the self-constructed scales with comparatively low reliability. Last but not least, there

is a lack of previous research on the specific topic, which was accompanied by lack of access to relevant information. This hinders the credibility and scope of this research, since previous literature on the topics help lay a foundation for understanding the research problem under investigation (University of Southern California, n.d.).

However, this study combines quantitative and qualitative approaches, which could balance out the limitations of each method because of triangulation (Tzagkarakis & Kritas, 2022), while it also provides stronger evidence and confidence in the findings. In this case, the combination of methods provided better insight on the explored topic of research by aiming for a more complete picture (Greene, Kreider, & Mayer, 2005). It is also worthy of note that the topic of the behavioral patterns in relation to the type of the assessment and reasons behind free-riding is one of the least explored topics in regards to collaborative learning. Moreover, it provides insight especially on the least explored behavioral pattern, collaborative loafing.

Future research into this topic would benefit by surveying a greater number of students, since larger sample sizes can provide more accurate mean values, identify outliers that skew the data and a smaller margin of error (Zamboni, 2022). This would allow for a cross-sectional study in which individual students' attitudes towards collaborative learning in relation to behavioral patterns that occur and the type of the assessment could be identified and monitored at the same time and can be a starting point for future research on the field (Simkus, 2021). Moreover, future studies could be taking into account that there are several factors (e.g., previous collaborative experiences, group constellations, task characteristics) that might promote the occurrence of behavioral patterns, therefore further research is needed in order to establish these factors and provide suggestions to decrease the potential of the behavioral patterns. This could prove beneficial for the wider student population, since they

could gain better skills and knowledge by the use of collaborative learning in higher education if actions against the occurrence of the behavioral patterns are taken.

Practical Implications for Teachers

In conclusion, this study provides insight that could be considered beneficial for teachers, since students' perceptions showed that the occurrence of behavioral patterns, such as free-riding, social and collaborative loafing are a common phenomenon that hinders the learning processes during collaborative learning, which is often more difficult to monitor, especially in higher educational settings. The study of Zambrano et al. (2018) found that there are differences in the manner that students experienced with collaborative learning work in comparison to inexperienced; however, positive or negative previous experiences are also transferred to future collaborative events (Strijbos, 2016). Therefore, teachers should take into account their students' previous collaborative experiences in combination with all the elements of collaborative learning when designing and structuring collaborative assignments. Peer evaluation is also suggested by the findings, since it can provide the teachers with a better overview of the groups, and individuals' contributions (Hall & Buzwell, 2013). This would help students benefit the utmost from collaboration and avoid behavioral patterns that usually occur and influence their perceptions towards collaborative learning. The exploration of reasons behind free-riding highlights the need to acknowledge and observe if specific students are in need of extra support before being characterized as apathetic (Hall & Buzwell, 2013).

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Appendix A

Research Information Letter

Dear student,

During the study, so-called "collaborative learning", also known as "group work", plays a major role. For example, students work together on a project or a research report. The final grade for a course (or part of it) is often based wholly or partly on an assessment of the group work, but there are large differences in the way this is done.

In order to find out more about how students experience the assessment of group work, students at the University of Groningen are questioned in this study. This concerns a broad survey among students of different years and faculties.

What does participating in the study mean for you?

By means of a questionnaire, we examine how students from different faculties experience the assessment of group work. We use fictitious situation sketches and ask students to put themselves in that situation and indicate how they would experience the assessment of group work. Completing the questionnaire takes about 20 minutes.

Consent

Prior to the study, we will ask you to indicate that you would like to participate in the study. Participation in the study is completely voluntary and you can stop at any time. So, if you do not want to continue while filling in the questionnaire, you can stop. Of course, we hope that you will participate.

Use and storage of data

All answers given while filling in the questionnaire will be treated confidentially. This means that the questionnaires and answers are kept secure and that only the researchers can see the completed questionnaires.

The Qualtrics program automatically collects the IP address of the person completing the questionnaire, but this information will be deleted immediately at the start of data processing. This means that the research results can never be traced back to you.

Your rights

If you no longer wish to participate in the study, you can indicate this to the researchers by contacting the project leader. Your data will then be removed from the data files. This is possible until the data are analyzed (from 15 April 2022). If you have any questions about privacy, you can also contact the researchers. If the researchers cannot answer your question, you can submit it to the Data Protection Officer of the University of Groningen (via privacy@rug.nl).

In need of more information?

If you would like to know more about the study, please contact the undersigned.

With kind regards, on behalf of the research team,

Messi Aikaterini

Student Rijksuniversiteit Groningen

a.messi@student.rug.nl

Prof. dr. Jan-Willem Strijbos

Rijksuniversiteit Groningen

j.w.strijbos@rug.nl

Appendix B

Consent form

Dear student,

Via this form you can indicate whether you want to participate in the questionnaire about how students experience the assessment of group work.

- I have read the information letter and explanation of the questionnaire carefully. I understand what participation in the study entails.
- I understand that participation in the questionnaire is voluntary. I choose to participate. I can stop participating at any time. If I decide to stop participating, I do not have to give a reason.

I indicate below whether I want to participate in the questionnaire or not.

I,,

student at the Rijksuniversiteit Groningen,

consent to the participation in the questionnaire about how students experience the assessment of group work.

- Yes, I **consent** to participate in the study; this permission runs until December 2022.
- No, I do **not consent** to participate in this study.

Signature

Place

Date

Note. As a research participant, you are entitled to receive a copy of this informed consent.

Appendix C

Questionnaire

Student perceptions on the influence of the assessment of collaborative learning on behavior

Welcome to the research study: “*Student perceptions on the influence of the assessment of collaborative learning on behavior*”.

Dear student, During the study, so-called “collaborative learning”, also known as “group work”, assessment plays a major role. For example, students work together on a project or a research report. The final grade for a course (or part of it) is often based wholly or partly on an assessment of the group work, but there are large differences in the way this is done. In order to find out more about how students experience the assessment of group work, students currently enrolled at a Dutch higher institution are questioned in this study. This concerns a broad survey among students of different years and faculties.

What does participate in the study mean for you?

By means of a questionnaire, we examine how students from different faculties experience the assessment of group work. We use fictitious situation sketches and ask students to put themselves in that situation and indicate how they would experience the assessment of group work. Completing the questionnaire takes about 20 minutes.

Consent

Prior to the study, we will ask you to indicate that you would like to participate in the study. Participation in the study is completely voluntary and you can stop at any time. So, if you do not want to continue while filling in the questionnaire, you can stop. Of course, we hope that you will participate.

Use and storage of data

All answers given while filling in the questionnaire will be treated confidentially. This means that the questionnaires and answers are kept secure and that only the researchers can see the completed questionnaires. The Qualtrics program automatically collects the IP address of the person completing the questionnaire, but this information will be deleted immediately at the start of data processing. This means that the research results can never be traced back to you.

Your rights

If you no longer wish to participate in the study, you can indicate this to the researchers by contacting the project leader. Your data will then be removed from the data files. This is possible until the data are analyzed (from 30 March 2022).

If you have any questions about privacy, you can also contact the researchers. If the researchers cannot answer your question, you can submit it to the Data Protection Officer of the University of Groningen (via privacy@rug.nl).

In need of more information?

If you would like to know more about the study, please contact the undersigned.

With kind regards, on behalf of the research team,

Aikaterini Messi Student Rijksuniversiteit Groningen

a.messi@student.rug.nl

Prof. dr. Jan-Willem Strijbos Rijksuniversiteit Groningen

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Q1. Consent form

I have read the information letter and explanation of the questionnaire carefully. I understand what participation in the study entails. I understand that participation in the questionnaire is voluntary. I choose to participate. I can stop participating at any time. If I decide to stop participating, I do not have to give a reason. I indicate below whether I want to participate in the questionnaire or not.

- Yes, I consent to participate in the study; this permission runs until December 2022. (1)
- No, I do not consent to participate in this study. (2)

Demographic Information

Q2. What is your age? (In years)

Q3. Gender

- Male (1)

- Female (2)
- Non-binary / third gender (3)
- Prefer not to say (4)

Q4. What is your nationality?

Q5. Are you currently enrolled at a Dutch university?

- Yes (1)
- No (2)

Q6. Current Level of Education

- Bachelor's degree (for example: BA, BS) (1)
- Master's degree (for example: MA, MS, MEng, MEd, MSW, MBA) (2)

Q7. Faculty (e.g., Faculty of Behavioral Sciences)

Q8. Program of studies (e.g., MSc Learning in Interaction)

General Collaborative Learning Experiences

Q9. Have you ever been part of group work at university?

Yes (1)

No (2)

Q10. If yes, please briefly describe the group work situation and how it was assessed? What was the type of the assessment (i.e., group grade, individual grade or a combination of group and individual grade)? To what extent were you involved in the collaborative process? (max. 100 words)

Q11. During the group work situation you described, did you notice behaviors from your fellow group members that either positively or negatively influenced you or the collaborative process? If yes, could you please elaborate? (max. 100 words)

Q12. How would you rate your overall experience of group work in relation to:

	Very dissatisfied (1)	Dissatisfied (2)	Neither dissatisfied nor satisfied (3)	Satisfied (4)	Very satisfied (5)
1. the learning processes (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. the collaboration with the rest of the group members (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. the assessment
and the final grade
(3)

Typical Behavioral Patterns

Q13. Please state to what extent you agree or disagree with the following statements.

	Fully Disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Fully Agree (5)
1. I often adjust the amount of effort I devote when working together in order to focus on other assignments. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I invest the same effort in group assignments, regardless of the effort invested by my fellow group members. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I prefer to divide tasks among group members to guarantee a high grade. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I often adjust the amount of effort I devote when all students receive the same group grade for a group assignment. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I often notice changes in the levels of my motivation when one group member devotes less effort to the group assignment. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. I often notice changes in the levels of my motivation when several group members devote less effort to the group assignment. (6)	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
7. Group members that I depend on to get my job done for the group, often meet my expectations. (7)	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>

Q14. You are a master student. One of your professors requires you to collaborate with your classmates on a group assignment which will be assessed with a group grade and this will determine the final grade you will receive at the end of the course. The assignment is divided into five tasks, which will focus on five different aspects. One of the tasks is to write a short story about a long journey interrupted by a disaster, that will be assessed based on the writing skills and creativity of the group. Another task is to draw a map of the journey that your group writes about in the short story, in order to visualize this journey. The professor created groups of five students. Jessie is one of the members of your group. Half-way the assignment you notice that Jessie does not devote the same amount of effort as you and the rest of the group members. You also know from conversations that Jessie does not receive very good grades. Charlie is very skilled in writing short stories and has a high level of writing skills, while Denver is talented in drawing. Lastly, Sammie has strong social skills.

General Question

How would you behave in this situation? Please describe briefly. (max. 100 words)

Q15. You are a master student. One of your professors requires you to collaborate with your classmates on a group assignment which will consist of a group part and an individual part. For

each part you will receive a separate grade, but 50% of your final grade will be determined by the group part and 50% by the individual part. The group part of the assignment is divided into five tasks, which will focus on five different aspects. One of the tasks is to write a short story about a long journey interrupted by a disaster, that will be assessed based on the writing skills and creativity of the group. Another task is to draw a map of the journey that your group writes about in the short story, in order to visualize this journey. The individual part is to write a reflection report about the collaboration and your individual learning process. The professor created groups of five students. Jessie is one of the members of your group. Half-way the assignment you notice that Jessie does not devote the same amount of effort as you and the rest of the group members. However, you know from conversations that Jessie receives good grades. Charlie is very skilled in writing short stories and has a high level of writing skills, while Denver is talented in drawing. Lastly, Sammie has strong social skills.

General Question

How would you behave in this situation? Please describe briefly. (max. 100 words)

Q16. You are a master student. One of your professors requires you to collaborate with your classmates on a group assignment which will be assessed with a group grade and this will determine the final grade you will receive at the end of the course. The assignment is divided into five tasks, which will focus on five different aspects. One of the tasks is to write a short story about a long journey interrupted by a disaster, that will be assessed based on the writing skills and creativity of the group. Another task is to draw a map of the journey that your group writes about in the short story, in order to visualize this journey. The professor created groups of five students. Jessie is one of the members of your group. Half-way the assignment you

notice that Jessie does not devote the same amount of effort as you and the rest of the group members. However, you know from conversations that Jessie receives good grades. Charlie is very skilled in writing short stories and has a high level of writing skills, while Denver is talented in drawing. Lastly, Sammie has strong social skills.

General Question

How would you behave in this situation? Please describe briefly. (max. 100 words)

Q17. You are a master student. One of your professors requires you to collaborate with your classmates on a group assignment which will consist of a group part and an individual part. For each part you will receive a separate grade, but 50% of your final grade will be determined by the group part and 50% by the individual part. The group part of the assignment is divided into five tasks, which will focus on five different aspects. One of the tasks is to write a short story about a long journey interrupted by a disaster, that will be assessed based on the writing skills and creativity of the group. Another task is to draw a map of the journey that your group writes about in the short story, in order to visualize this journey. The individual part is to write a reflection report about the collaboration and your individual learning process. Jessie is one of the members of your group. Half-way the assignment you notice that Jessie does not devote the same amount of effort as you and the rest of the group members. You also know from conversations that Jessie does not receive very good grades. Charlie is very skilled in writing short stories and has a high level of writing skills, while Denver is talented in drawing. Lastly, Sammie has strong social skills.

General Question

How would you behave in this situation? Please describe briefly. (max. 100 words)



Social Loafing

Q18. Given the situation described in this scenario, please state to what extent you agree or disagree with the following statements.

	Fully Disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Fully Agree (5)
1. The amount of effort I will devote will alter in order to focus more on other assignments. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I would devote the same amount of effort despite whether group members will receive the same group grade for this group assignment or not. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. The addition of Jessie in our group would positively influence the amount of effort I will devote to the group assignment. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I would devote more effort in case of an exclusively individual assignment. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I would devote the same effort to every task despite its type (i.e., group task, individual task) (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I would expect the group members to include everyone in the decision-making process. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Collaborative Loafing

Q19. Given the situation described in this scenario, please state to what extent you agree or disagree with the following statements.

	Fully Disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Fully Agree (5)
1. I would divide tasks among group members to guarantee a high grade. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I would choose the easiest task based on my skills. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I would attempt to find the easiest way to guarantee a satisfactory grade for our group. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I would be inclined to confront Jessie, since the reduction in effort might lead to an unsatisfactory group grade. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I would discuss with the fellow group members about Jessie's reduction in effort, because this behavior might lead to an unsatisfactory group grade. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Given the way the members would perform their roles I would feel satisfied. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The Sucker Effect

Q20. Given the situation described in this scenario, please state to what extent you agree or disagree with the following statements.

	Fully Disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Fully Agree (5)
1. The effort of my fellow group members would not influence the effort I invest in the group assignment. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I would become more motivated due to the reduction in effort by Jessie. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. My feelings towards Jessie will remain the same despite the reduction in effort. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I would devote the same amount of effort even though I would not consider it fair to work more than one of my fellow group members (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I would feel that the group members people on whom I depend on to get my job done in the group meet my expectations. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I would find myself in conflict with Jessie because of the lack of effort. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q21. Is there anything you would like to add, clarify, comment, suggest in regards to the scenario and questions you answered?

