Development of Questionnaire for assessing Student's Tendency between Collaborative and Cooperative Learning; a Questionnaire for Higher Education Instructors

Master's Thesis

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Abstract

Current study aimed to design and validate a questionnaire for assessing university students' inclination towards a small-group learning approach during group assignments, specifically focusing on two key approaches: collaborative learning (CL) and cooperative learning (CoL). Developing this questionnaire is crucial while higher education instructors design group assignments incorporating defined learning goals and students frequently utilize an unsuitable small-group learning approach that does not align with these learning goals. Hence, instructors encounter difficulty in assessing how students typically approach the assignment, as the students' manner of approaching the small-group learning assignment is still a black box for instructors. Gaining insights into students' tendency for either CL or CoL during small-group learning equips instructors to make informed pedagogical decisions, enabling them to offer targeted instruction and additional guidance as needed, directing students toward the appropriate small-group learning approach. The current paper described the development of the Student's Tendency between Collaborative and Cooperative Learning Questionnaire (STCCLQ), including item construction, initial pilot testing, subsequent pilot testing, and validation procedures to ensure its validity and reliability. A questionnaire that assess students' inclination between small-group approaches was not available yet. The final questionnaire contains a set of 14 paired items. Each pair consists of one item related to a CL characteristic and one item related to a CoL characteristic. After conducting the Exploratory Factor Analysis (EFA), a three-factor solution was successfully identified. These three factors represent the following constructs: "Cognitive and Interpersonal demands", "Structure", and "Involvement Instructor".

Keywords: students' tendency in small-group learning approach, collaborative learning, cooperative learning

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Educational institutions are widely using small-group learning techniques for teaching students (Johnson & Johnson, 2000; Oxford, 1997; Sulaiman & Shahrill, 2015). Small-group learning refers to students working together on learning tasks, differing from the traditional 'direct transfer' model where the instructor solely imparts knowledge and skills (Lehtinen, et al, 1998). Small-group learning is used since properly implemented small-group learning can overall significantly improve student achievement (Jackson, et al., 2014; Jones, 2007).

Collaborative learning (CL) and Cooperative learning (CoL) are two distinct approaches to small-group learning (Paulus, 2005). CL and CoL yield different characteristics, outcomes, and serve distinct purposes (Oxford, 2011). The primary objective of CL is to collectively construct knowledge (Davidson & Major, 2014)). Consequently, in a CL assignment, the expected result is thus that all students acquire comprehensive knowledge of the entire task. Conversely, CoL strives to optimize individual and collective learning outcomes (Lehtinen et al., 1998; Johnson, 1991; Slavin, 2010), meaning that the expected outcome of the students is to master a specific portion of the task and deliver a final product (Panitz, 1999).

When instructors design group assignments, they must choose the small-group learning approach that aligns best with the intended learning goal (Blumenfeld, et al., 1996; Hammar Chiriac, 2014). To attain the intended learning goal, students must correctly interpret and apply the designated small-group learning approach. One significant problem is that students frequently use strategies that are not aligned with the intended learning goal of the activity (Hathorn & Ingram, 2002; Johnson et al., 1998), since students' internal script of the small-group event might be inadequate for the task (Carmien, et al., 2007). When such situations arise, it hampers the learning (Carmien, et al., 2007). To address the mismatch between the approaches, it becomes necessary for instructors to intervene. However, currently, the students' way of approaching the small-group learning assignment remains still a black box for instructors. After giving students the assignment, it is difficult for instructors to know how students typically approach and execute the task. The ambiguity makes it challenging for instructors to comprehend what happens during small-group learning.

Small-Group Learning Approaches

Considering the small-group learning challenge for instructors, the widespread adoption of small-group learning comes actually as no surprise, given the significant benefits that can arise from the correct implementation of these small-group learning approaches (Jackson, et al.,

2014; Jones, 2007). To start, both approaches offer a comparable academic benefit, namely fostering the growth of critical thinking abilities (Davidson & Major, 2014; Nokes-Malach et al., 2015). As per students' perspectives, engaging in group work leads to the acquisition of diverse or additional knowledge compared to working independently. Beyond academic knowledge, group work also facilitates the acquisition of advanced insights into group dynamics, individual roles within groups, and the behaviours and contributions of fellow group members (Hammar Chiriac, 2014).

Similarities in CL and CoL

Just like the common benefits that can appear from both small-group learning approaches, similarities in the two small-group learning approaches CL and CoL can also be found in their goals. Both small-group learning approaches concentrate on obtaining new academic subject matter and thus eventually gaining new knowledges (Davidson & Major, 2014; Hammar Chiriac, 2014).

There are also some characteristics of the two approaches overlapping. For instance, positive interdependence, is a characteristic found in both CL and in CoL (Bonilla Eslava & Echeverri Cárdenas, 2023; Johnson & Johnson, 2009). Positive interdependence indicates that individuals within a group are mutually dependent on one another to achieve a common goal or task (Johnson & Johnson, 2009). A shared learning goal is the central driving force when working on the assignment (Slavin, 2010; Springer et al., 1999). When working towards a shared learning goal, the success of the entire group is dependent on the success of each student independently (Laal, 2013 Slavin, 2010). Individual accountability is likewise a characteristic that fits both definitions of CL and CoL, entailing that each groups member is responsible for their own learning (Johnson & Johnson, 2009; Rohrbeck et al., 2003).

Dissimilarities between Cl and CoL

However, it is apparent that CL and CoL have as well distinct elements (Matthews et al., 1995; Paulus, 2005), meaning differences in goals, characteristics, and effects. When looking at the goals of both small-group learning approaches; CL focusses on working together, while CoL emphasized working with each other (Davidson & Major, 2014). More specifically, this indicates that CL focusses on collective constructed knowledge as desired result (Davidson & Major, 2014). Highlighting the creation of a shared understanding of the topic by incorporating diverse perspectives of other team members and from there developing an own unique conceptual framework (Laal, 2013; Laal & Ghodsi, 2012; Laal & Laal, 2012;

Lajoie & Derry, 2013; Osipov & Ziyatdinova, 2015; Springer et al., 1999) Contradictory, CoL focus on optimized individual and collective learning outcomes (Lehtinen, et al, 1998; Johnson, 1991, Johnson, 1994; Slavin, 2010). Meaning that during the assignment, the students are working towards a targeted final product (Panitz, 1999).

In addition to this, CL and CoL also contain multiple distinguishing characteristics. The first characteristic that sets them apart is the way of task completion. CoL is characterised by the division of labour (Lajoie & Derry, 2013; Paulus, 2005). Meaning that during CoL, tasks will be divided and completed individually which makes each person responsible for a specific portion of the problem-solving process (Kozar, 2010; Lajoie & Derry, 2013; Paulus, 2005; Roschelle & Teasley, 1995). Conversely, CL is characterised by the learning process where group members work together towards a joint solution (Lehtinen, et al., 1998; Laal, 2013; Osipov & Ziyatdinova, 2015). Here, the emphasis shifts from the outcome of the group's assignment to the shared process of knowledge creation through dialogue while working on group assignments (Kozar, 2010; Lajoie & Derry, 2013; Paulus, 2005; Roschelle & Teasley, 1995).

A second difference between CL and CoL becomes apparent when looking at the way group assignments are structured. A structured and systematic approach can be linked to CoL (Millis, 2002; Oxford, 1997; Panitz, 1999). The underlying idea of the firm structure is that it will facilitate discussions between group members with the goal to create a better understanding (Rose, 2004). An unstructured, synchronized, and coordinated approach can be linked to CL (Lehtinen, et al., 1998; Lajoie & Derry, 2013; Springer et al., 1999). According to Rose (2004), less structure implies more elaborated and in-depth level of dialogue, leading towards more conceptual oriented interaction.

Thirdly, during CoL the students bear sole accountability for their own personal learning experiences (Hord, 1981; Lajoie & Derry, 2013; Paulus, 2005), where during CL students are responsible for their own learning (Gokhale, 1995; Laal & Ghodsi, 2012; Panitz, 1999) and responsible for others' learning within the group (Gokhale, 1995; Laal, 2013; Laal & Ghodsi, 2012). While CL includes the student's active engagement in both individual and collective processes, this approach can inquire a greater deal of effort for students (Lehtinen, et al., 1998; Hord, 1981; Laal, 2013; Mayer & Mayer, 2005).

Fourth, the role of the instructor during small-group learning differs as well between the two approaches. Wherein CoL, the instructor holds complete control over the process

(Matthews et al., 1995; Panitz, 1999) and assumes the role of a guide or instructor (McInnerney & Roberts, 2009), conversely, in CL, the control over the process and learning is primarily in the hands of the students (Matthews et al., 1995; Panitz, 1999).

Finally, the way interaction takes place and the function of the interaction during group assignments also differs between CoL and CL. In CoL, there typically is quick, cohesive, and consistent interaction (Rose, 2004), aimed at fostering discussions to enhance the effectiveness of group work processes (Springer et al., 1999). In CL, extensive and profound interaction between students takes place (Rose, 2004), which is important for realizing a shared learning goal (Johnson, 1990 as cited in Laal, 2013).

Outcome Dissimilarities between CL and CoL. After engaging with in one of the two small group learning approaches, several different social, psychological, and academic benefits might emerge. A few of these potential benefits are highlighted in the next section. With respect to the social benefits, CL enhances social support for learners and provides opportunities for peer teaching within an atmosphere that encourages collaborative practice (Laal & Ghodsi, 2012; Osipov & Ziyatdinova, 2015). CoL promotes respect and appreciation for the contributions of fellow students, creating a cohesive learning community (Millis, 2002).

With respect to the psychological benefits, CL is associated with an observable increase in students' self-esteem, reduction of students' anxiety levels, and a more positive attitude towards instructors (Laal & Ghodsi, 2012). Through CoL, enjoyment in attending classes and more confidence to ask questions can be considered as psychological benefits (Jumoke Bukunola & Idowu, 2012; Millis, 2002).

Academic benefits of CL include encouragement of active engagement within specific curricula and active participation in the learning process. Added to this, students' improved classroom results are also indicated as a result after using CL (Laal & Ghodsi, 2012). Academic benefits of CoL are more in-depth learning, enhancement of students' retention and increasement in students' motivation to learn (Jumoke Bukunola & Idowu, 2012; Millis, 2002).

Questionnaire STCCLQ

As mentioned previously, the literature reveals both commonalities and distinctions between CL and CoL. To gain clarity on the specific small-group learning approach that a student tend to favor when presented with group assignments, the use of a questionnaire that captures the dissimilarities between the two small-group learning approaches can be

instrumental in providing instructors with insights into students' inclinations. A wide array of validated questionnaires exists to assess the use of CL or CoL. However, what remains absent from the current body of research is the comparison between these two approaches, particularly with regard to students' tendencies prior to commencing the assignment. Most existing studies on this subject concentrated on evaluating students' small group learning experiences after performing the group assignment (Cumming, et al., 2015; Delgado-García, et al., 2022; Fernández-Rio, et al., 2017; León-del-Barco, et al., 2018; Lin, 2004). In essence, the absence of pre-assignment questionnaire in this specific context presents a notable research gap in the field of small-group learning.

Such a questionnaire would help the instructors to make informed decisions that optimize students learning experiences, since the insights derived from such a questionnaire can be useful to instructors in determining whether students are addressing assignments with the correct approach. If this is not the case, instructors have the option to provide students with additional instruction on utilizing the correct small-group learning approach beforehand or offering extra guidance during the assignment. Instructional interventions that have proven to be effective in supporting students to engage in the small group learning processes are giving feedback, questioning students, and prompting over the learning process (Stevens, et al., 1991; van Leeuwen & Janssen, 2019).

The process of developing the Student's Tendency between Collaborative and Cooperative Learning Questionnaire (STCCLQ) involves the following steps: item construction, initial pilot testing, subsequent pilot testing, and validation procedures. This paper will specify the execution of these steps.

Methods

Following methods section will give a clear overview about the construction and validation of the STCCLQ based on the guidelines of Tsang et al. (2017). An advanced organizer is presented as overview for the steps that are required for the development of the STCCLQ questionnaire (Figure 1).

Figure 1

Advanced Organizer Methods


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│                  Process of Questionnaire Development                 │
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┌──────────┐  ┌─────────────────────────────────────────────────────────┐
│          │  │ 1. Identify Dimensionality of Construct                 │
│          │  │ 2. Determine Questionnaire Format                       │
│Construction│ │ 3. Determine Item Format                                │
│          │  │ 4. Item development                                     │
│          │  │ 5. Review and Revise Initial Pool Items                 │
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                        │     Preliminary Pilot Testing      │
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                        │    Adjustments in Questionnaire     │
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                        │           Pilot Testing            │
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┌──────────┐  ┌─────────────────────────────────────────────────────────┐
│          │  │ Validity                       Reliability              │
│Validation│  │ - Construct Validity           - Internal consistency   │
│          │  │                                                         │
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Note. The advanced organizer is based on the "Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine" derived from the paper of Tsang et al. (2017).

Construction

Identify Dimensionality of Construct

To commence the research process, a matrix (Table 1) is constructed incorporating the findings derived from the small-group learning approaches literature review presented in the introduction. This matrix will be employed as the basis for the subsequent questionnaire design. Five primary constructs within the two small-group learning approaches arose from the literature review, facilitating a comparative analysis between them. The indicated constructs are Task Completion, Cognitive and Interpersonal Demands, Structure, Social Interaction, and Instructor Involvement.

Task Completion. The main distinction between the two approaches (CL and CoL) can be illustrated by considering asynchronous versus synchronous activity (Roschelle & Teasley, 1995). In asynchronous activities, students engage in CoL where tasks are divided and completed individually, with each person responsible for a specific portion of problem-solving. Asychronous activity emphasizes the final product. In synchronous activities, the

focus is on the shared process of knowledge creation rather than the result. It involves solving the problem together through dialogue, aligning with CL (Kozar, 2010; Lajoie & Derry, 2013; Paulus, 2005; Roschelle & Teasley, 1995).

Cognitive and Interpersonal Demands. Cognitive and interpersonal demands emerge more in CL (Panitz, 1999) in comparison with CoL. Cognitive demands are mental processes active during problem-solving (Tsaparlis, 2021). Interpersonal demands are mental processes active when students get confronted with characteristics of relationships within organizations (*Conflict and Stress in Organizations*, n.d.). Cognitive and interpersonal demands ask a lot of students. Mental processes do not come natural to students while normally individual responsibility and accountability gets encouraged via individual grading. Asking students to work together is a contradict on the direct learning model and becomes therefore becomes more of a challenge for students (Kozar, 2010). Processes that occur during CL, like orally explaining how to solve problems, teaching one's knowledge to others, checking for understanding, discussing concepts being learned and connecting present with past learning, are cognitive activities that contain high cognitive and interpersonal demands (Laal, 2013).

Structure. The contrast between CL and CoL also becomes evident in the structure that is implemented during learning. Structure in learning can be described as a set of psychologically and sociologically based techniques that facilitate the attainment of learning goals (Oxford, 1997). A characteristic of CoL is the highly structured nature of the tasks (Millis, 2002; Oxford, 1997; Panitz, 1999). The structure facilitates discussions with the goal to create a better understanding via a consistent level of interaction (Rose, 2004). Contrary to the fixed structure in CoL, CL research indicates that too much structure within a task with higher order thinking is dysfunctional while it holds back the conceptual oriented interaction (Cohen, 1994; Rose, 2004). Less structure implies more elaborated and in-depth levels of dialogue (Rose, 2004).

Social Interaction. As previously discussed, the different kinds of structure in CL and CoL yield distinct interaction patterns and learning processes. Social interaction takes places during small-group learning and can be described as a give-and-take influence between individuals during social meet-ups (*Introduction to Sociology–2nd Canadian Edition*, n.d.). During CoL, social interaction is characterized by rapid, cohesive, and sustained interaction among students. In contrast, CL is distinguished by its more extensive and profound interactions (Rose, 2004).

Involvement Instructor. Students can be lead in their activities by instructors via different styles (Osipov & Ziyatdinova, 2015). The involvement of the instructor during groups assignment can be rated on a continuum. At one extreme of this continuum teacher-centred can be placed, at the other extreme student-centred. Teacher-centred means that instructors choose the knowledge that the students need to learn and attempt to put this knowledge in students' heads (Jacobs, 2015). In the student-centred approach, students have more input in the topics and materials they need to learn (Jacobs, 2015). According to Matthews et al., 1995 as cited in Rose (2004), CoL and CL are distinct in the degree of the involvement of the instructor. CL is more student-centred, where CoL is more teacher-centred (Jacobs, 2015; Panitz, 1999). So CL shifts the responsibility of learning to the students, where in CoL the instructor maintains complete control (Matthews et al., 1995; Panitz, 1999) and has the function of guide (McInnerney & Roberts, 2009).

Table 1

Test-matrix CL vs CoL

Construct	Collaborative Learning	Cooperative Learning
Task completion	Completed together through dialogue. (Kozar, 2010; Lajoie & Derry, 2013; Paulus, 2005; Roschelle & Teasley, 1995).	Task divided up and completed individually. (Paulus, 2005)
Cognitive and Interpersonal Demands	More interpersonal and cognitive demanding (Kozar, 2010; Laal, 2013)	Less interpersonal and cognitive demanding
Structure	Less structure (Cohen, 1994; Rose, 2004)	More structure (Millis, 2002; Oxford, 1997; Panitz, 1999)
Social Interaction	Social interactions are more extensive and profound (Rose, 2004)	Social interactions are characterized by rapid, cohesive, and sustained (Rose, 2004)
Involvement Instructor	More student-centred (Jacobs, 2015; Panitz, 1999)	More teacher-centred (Matthews et al., 1995; Panitz, 1999)

Determination of Questionnaire Format

The STCCLQ questionnaire is developed in Qualtrics (*Qualtrics*, n.d.). Qualtrics is an online survey application. An online survey tool is chosen because it makes it more approachable to collect and easier to analyse the results of the questionnaire.

Determination of Item Format

In the STCCLQ, the questions are all closed ended and designed in a seven-point Likert scale format (Table 2). When considering reliability, a seven-point Likert scale appears to be the most suitable choice for this questionnaire. Using more or fewer than seven points in the Likert scale could potentially reduce the reliability, either due to the overwhelming number of choices or the limited range of response options (Symonds, 1924). Close-ended questions lead to a limited number of response options, and are therefore easier to administer and analyse than open-ended questions (Tsang et al., 2017). This is chosen because the questionnaire is designed for instructors who will use the instrument to find out students' tendency. An easy way to analyse the data resulting from the questionnaire is therefore preferable. Within the questionnaire, two case studies involving group assignments will be provided. Following these case studies, there will be questions related to CL and CoL presented specifically containing elements from these particular cases. Therefore, the questionnaire can be classified as a vignette study (Atzmüller & Steiner, 2010).

Table 2

Preview Test-items STCCLQ

STCCLQ- items	Seven-point Likert scale						
	StD	D	SoD	N	SoA	A	StA
1.1 We work together on parts of this assignment. 1.2 We work separately on parts of this assignment.							
2.1 We challenge each other's ideas or reasoning, to come up with better solutions during this assignment. 2.2 We challenge ourself to come up with good reasoning and ideas for a part of this assignment that we work on.							

Note. Likert-scale options are represented by the following abbreviations, along with their respective meanings: Strongly Disagree (StD), Disagree (D), Somewhat Disagree (SoD), Neutral (N), Somewhat Agree (SoA), Agree (A), Strongly Agree (StA).

Item development

Utilizing the constructs derived from the test matrix, the first version of this questionnaire consisted of a total of 58 test items (Appendix c). Notably, these items were configured in pairs, with each pair comprising two interrelated items. Specifically, one item within the pair focused on CL, while the other item focused on CoL. There are two distinct types of item pairs. In one set of item pairs (*n*=18), the questions are formulated in an opposing manner, where the content of the CL question items contradicts that of the CoL question items (referred to as "O"). In the other set of item pairs (*n*=11), one question item focuses on CL while the other focuses on CoL, but they do not contradict each other (referred to as "D"). Consequently, both items within the item pairs can be rated as high or low on the Likert- scale (Table 3).

Table 3

Item-relation Pairs

STCCLQ- items	Item-Relation Opposite/ Different
1.1 We work together on parts of this assignment. 1.2 We work separately on parts of this assignment.	D
5.A We mainly work together on this assignment. 5.B We mainly work on this assignment for ourselves.	D

It is important to highlight that all these items were newly composed and did not draw upon items from any existing questionnaires as none existed. Added to this, there are also no reverse-scored items developed in this questionnaire.

Review and Revise Initial Pool Items

Before commencing the preliminary pilot testing, it is essential for an expert to assess the questionnaire items (Tsang et al., 2017). A review session was conducted with the primary supervisor of this master's Thesis and the researcher. The focus of this review session was to refine the question items; ensuring their accuracy, addressing item construction issues, and ensuring grammatical correctness of the items

Preliminary Pilot Testing

For the preliminary pilot testing, a think-aloud study was conducted. The purpose of the think-aloud sessions was to assess the students' understanding and interpretation of the questions included in the questionnaire (Appendix C). Three students, all enrolled in a master's program (Health Science, Computer Science and Educational Science and Technology) at the University of Twente, were purposefully selected to participate in the think-aloud sessions based on personal connections (Appendix F). The sample was chosen with the intention of obtaining diverse feedback from students representing different academic disciplines and international backgrounds, which makes this a Quota sample (Moser, 1952). These students represented various study fields, namely Behavior and Society, Technology, and Health, one of them was an international student. The sessions were conducted in a consistent environment, ensuring uniformity across all conditions but separately from each other in time.

Before the sessions began, the participants were informed about the audio recording process and were requested to provide their consent. All participants granted permission for the recording. Subsequently, the students initiated the session by engaging in a jigsaw activity, which served as a preliminary exercise to facilitate the practice of thinking-aloud, an essential skill for the study. After a brief interval, the researchers interrupted the puzzle-solving activity and transitioned to the questionnaire. During this phase, the participants progressed through the questionnaire, vocalizing their thoughts and interpretations as they read each question Upon completion of the questionnaire, the researcher instructed them not to complete the pilot questionnaire that they might receive in subsequent study rounds.

Adjustments in Questionnaire

Following the think-aloud sessions, the questionnaire underwent some modifications based on the feedback received. Specifically, a certain number of items were removed *(n=10),* added *(n=2)* and altered *(n=48), r*esulting in the final version of the STCCLQ for the pilot study (Appendix D).

Pilot Testing

Participants

Students who had a (via-via) connection with the researcher, were contacted and invited to participate in the questionnaire, which makes this Convenience Sampling (Stratton, 2021). A total of 135 participants were involved, among these students, three completed the questionnaire as a think-aloud. However, 43 out of the 135 students did not complete the entire questionnaire, and they are considered drop-outs. This resulted in a sample of 89 university

students *(N = 135-43 (drop-outs)-3 (think-aloud) = 89)* that completed the pilot version of the questionnaire. The sample meets the minimum requirement of N=50 participants, as suggested by (de Winter et al., 2009), needed for assessing validity and reliability.

Students were recruited from bachelor and master programs at universities in the Netherlands, through convenience sampling, using the network of the researcher and a snowballing approach. Each participant was requested to supply details pertaining to their academic pursuits, which resulted in the following information; This study involved students enrolled in bachelor's *(n=39)*, pre-*(n=1)* master's *(n= 46)* or other *(n=3)* programs at the following universities: University of Maastricht *(n=14)* , Nijmegen *(n=2)* , Tilburg *(n=1)*, Rotterdam *(n=2)*, Twente *(n=41)*, Utrecht *(n=16)*, Amsterdam *(n=4)*, Eindhoven *(n=3)*, Wageningen *(n=1)*, Groningen *(n=2)*, Jheronimus Academy *(n= 1),* Edinburgh *(n=1)* or other *(n=1)*.

The distribution of the questionnaire spanned diverse fields of study, with participants originating from the domains of Economics (2.25%), Behaviour and Society (37.05%), Health (21.35%), Interdisciplinary (1.12%), Agriculture and Nature (1.12%), Law (3.37%), Language/Art/Culture (3.37%), Technology (25.84%), and other/unclear (4.48%). Among the respondents, 12.26% were international students. It is noteworthy that all participants provided their informed consent (except one drop-out), which was appended to the beginning of the questionnaire (Appendix A).

Procedure

After receiving the ethical approval, the data collection process of this research started. The questionnaire link was disseminated through various communication platforms such as WhatsApp, Instagram, and LinkedIn because these platforms are widely used by the target population. The messages explicitly stated that the purpose of the questionnaire was to gain deeper insights into the small-group working dynamics among university students. Additionally, it was mentioned that the questionnaire would require approximately 10 minutes to complete.

Upon accessing the questionnaire, the students were initially required to provide their informed consent. Once consent was obtained, they proceeded to answer all the questions included in the STCCLQ.

Validation

The items from the STCCLQ pilot need to be valid and reliable. A data analysis needs to take place to check the validity and reliability of the questionnaire. After this, adjustments need to be made to increase the validity and reliability.

Validity

Construct Validity. The construct validity of the STCCLQ measurement will be measured via an exploratory factor analysis (EFA) in RStudio. This is chosen because the literature review shows that the concepts are overlapping, and therefore it is possible that the different questionnaire items measure more than one construct. The items are thus not unidimensional (Burton & Mazerolle, 2011).

During the EFA, the Bartletts test of sphericity needs to be executed first. The test will give insight about the correlation between the questionnaire items. To continue with the EFA, this correlation needs to be significant (Burton & Mazerolle, 2011; Field, 2013).

After this, the Kaiser-Meyer-Olkin (KMO) measure needs to be checked to assess sampling adequacy. This measures the appropriateness of using a factor analysis based on sampling adequacy (Burton & Mazerolle, 2011). Optimally, the outcome of this measure is higher than 0.7, but to execute the EFA, it needs to be higher than 0.5 (Kaiser & Rice, 1974 as cited in Field, 2013).

For the EFA of the STCCLQ, the varimax rotation approach is chosen because the assumption is that the constructs are uncorrelated (Brown, 2009). The varimax rotation is the most common choice for the current situation (Costello & Osborne, 2019). During the analysis, a factor loading cut-off of .3 is used to indicate the factor loadings as insignificant (Eaton, 2019).

Reliability

Internal Consistency. Cronbach's alpha measures the internal consistency of a set of items or questions in a questionnaire. It indicates the level of confidence that can be placed in the entirety of the questionnaire, based on how consistent one of those questions would be if you asked it multiple times (Michalos, 2014). For current research, an alpha level of 0.8 is needed and labelled as respectable. An alpha level between 0.8 -0.9 is labelled as very good, and would thus be optimal (DeVellis & Thorpe, 2021).

Finally, item analysis will be used to filter the items in the questionnaire. Items which do not contribute something unique to the reliability of the questionnaire will be filtered.

"Cronbach's Alpha when item deleted" will be used for this purpose, which indicates the change in the sample value of alpha when excluding a scaling item (Raykov, 2008).

<div align="center">**Results**</div>

Validity

Construct Validity

Firstly, during the EFA the Bartlett's test of sphericity was conducted on the entire dataset, yielding a significant p-value of <0.001, indicating a violation of sphericity (Burton & Mazerolle, 2011; Field, 2013). The KMO value for the complete dataset with all questionnaire items was found to be 0.57, indicating a moderate level of sampling adequacy (Kaiser & Rice, 1974 as cited in Field, 2013). The number of factors to be retained for the EFA was determined using a scree plot and parallel analysis scree plot. These plots suggested that a 7-factor solution would be appropriate as the starting point for the factor analysis. However, it was observed that one factor in the 7-factor solution was measured by only 2 items, which does not meet the recommended minimum requirement of 3 items per factor (Costello & Osborne, 2019). To address this issue, alternative factor solutions were explored. A 6-factor solution was considered, which resulted in a better distribution of items across the factors and higher factor loadings. Furthermore, a 5-factor solution was examined, but it yielded lower factor loadings for several items, indicating a less optimal fit to the data. Based on these considerations, a 6-factor solution was chosen as the factor model for the time being. Subsequently, items with factor loadings <0.3 were identified and removed (Eaton, 2019) from the questionnaire. Added to this, both the cooperative and collaborative questions for each item were excluded. The following items with the corresponding factor loadings were removed from the dataset: Item 8.1 (-0.36), Item 8.2 (<0.3), Item 10.1 (0.37), Item 10.2 (<0.3), Item 12.1 (-0.31), Item 12.2 (0.39), Item 17.1 (0.57), Item 17.2 (<0.3), Item 24.1 (0.44), and Item 24.2 (<0.3).

The analysis was repeated after removing the aforementioned items. The Bartlett's test of sphericity continued to demonstrate the same significant violation of sphericity, while the KMO measure slightly improved (MSA = 0.62). Based on the scree-plot and parallel analysis scree plot, a 7-factor solution was initially recommended for this second data set, but due to factors with fewer than 4 items, the analysis proceeded with 6 factors and for the same reason eventually with 5 factors. The items with low factor loadings identified in the 5-factor solution

were excluded from the second dataset; Item 14.1 (<0.3), Item 14.2(0.39), Item 20.1(<0.3), Item 20.2(0.4), Item 24.1 (<0.3), Item 24.2 (-0.5).

The analysis was conducted again using the third dataset after removing the specific items. The Bartlett's test of sphericity revealed a significant violation of sphericity, replicating the previous findings. The Kaiser-Meyer-Olkin (KMO) measure improved slightly, reaching a value of MSA=0.64.

To determine the appropriate number of factors for the factor analysis, the scree plot and parallel analysis scree plot were examined. Initially, a 6-factor solution was suggested based on these plots. However, since one factor consisted of only 3 items, the analysis proceeded with a 5-factor solution. Further investigation of the 5-factor solution revealed that certain items exhibited low factor loadings. Consequently, these items were removed from the dataset. Specifically, Item 3.3 (-0.34), Item 3.4 (0.32), Item 13.1 (0.41), and Item 13.2 (0.3) were excluded from subsequent analyses.

With this updated dataset, the EFA is performed once again. The Bartlett's test of sphericity for this dataset yields the same p-value as before, indicating a significant violation of sphericity (p-value < 2.22e-16). The Kaiser-Meyer-Olkin measure increases to MSA=0.66. Once again, the recommended starting point for this analysis is 6 factors. However, regardless of whether 6, 5, or 4 factors are considered, the analysis indicates that one factor loads on only 3 items or fewer. Consequently, a 3-factor model is chosen as the basis for further analysis. Subsequently, upon examining the factor loadings, it is evident that additional items need to be removed. Specifically, Item 21.1 (0.33) and Item 21.2 (<0.3) are excluded.

After removing the items 21, the entire EFA was conducted once again. For this dataset, the Bartlett's test of sphericity yielded the same p-value as before. The Kaiser-Meyer-Olkin measure increased to MSA=0.68. This time, the recommended starting point for the analysis is 5 factors. When considering both 5 and 4 factors in the analysis, it was found that one factor was measured by only two questionnaire items. However, with 3 factors, the items were well distributed across the factors. Consequently, a 3-factor model with 28 items was chosen for further analysis. The corresponding factor loadings are presented in Table 4.

Table 4

Questionnaire Items with Factor Loadings

Factor 1

STCCLQ- items	Factor loadings Dataset 5

Q1.1 Together with my team members, I brainstorm about the pro-arguments and counterarguments.	**.45**
Q1.2. The arguments will be divided among the groups members and worked on separately.	**-.41**
	.54
Q2.1. While working on this group assignment, I am aware of the progress of my fellow students on this assignment.	
Q2.2 While working on this group assignment, I don't know exactly how far my fellow students are on this assignment.	**-.56**
	.58
Q4.1. While working on this assignment, I will do my best to understand my fellow student's view on the subject.	
Q4.2. While working on this assignment, I will mainly focus on my own understanding of the subject	**-.56**
	.59
Q7.1. While working on this assignment, I try to include ideas from fellow students.	**-.64**
Q7.2. While working on this assignment I focus mainly on my own ideas.	**.58**
Q9.1. When we are working on the group assignment, I prefer to sit together (online or offline).	**-.60**
Q9.2. When we are working on the group assignment, I prefer to do this separate from each other.	**.46**
Q15.1. During the weeks, we meet up a couple times to prepare the interviews and design the poster together.	**-.31**
Q15.2. During the weeks, we meet up to split up the different parts of this assignment and to check how we are doing on our parts.	**.57**
	-.55
Q16.1. During this assignment, I have close contact with my fellow students.	
Q16.2. During this assignment, I contact my fellow students only when necessary.	**.53**
Q18.1. While working on this assignment I feel the need to master all the (sub) skills that are needed to meet the final criteria.	**-.49**
Q18.2. While working on this assignment, I do not worry too much about mastering the (sub) skills if the groups meet the final criteria.	**.45**

Q23.1. While working on the poster, I try to understand how my fellow students want to design it.	**-.46**
Q23.2. While working on the poster, I will mainly use my own preference in the design of the poster.	

Factor 2

STCCLQ- items	Factor loadings Dataset 5
Q11.1. I expect the teacher does not check our progress during the writing assignment.	**.89**
Q11.2. When writing this paper, I assume that the teacher will keep an eye on our progress.	**-.96**
Q25.1. During the group assignment, I expect to have no contact with the teacher about the progress of the interviews.	**.64**
Q25.2. During the group assignment I assume that the teacher expects an update every now and then in which we indicate how many people we already interviewed.	**-.64**

Factor 3 (Structure)

STCCLQ- items	Factor loadings Dataset 5
Q5.1. At the beginning of this assignment, my team members and I will not establish a clear structure about how we will shape the entire paper.	**-.58**
Q5.2. At the start of the assignment, my team members and I agree on a format that we use as the structure of our paper.	**.57**
Q6.1. While working within the boundaries of this assignment, I go with the flow and see how the process develops over time.	**-.84**
Q6.2. While working within the boundaries of this assignment, I created a lot of structure for myself and work according a clear and predetermined plan.	**.85**
	-.84
Q19.1. When working towards the end product (the poster) we will not draw up a clear	
	.85

schedule except from the deadline that is already established.	
Q19.2. At the start of this assignment, we make a schedule in which it is clear to everyone when what needs to be finished	

Reliability

Internal consistency questionnaire

Overall, the revised factor model consisting of 3 factors demonstrated good internal consistency, with a Cronbach's alpha (α) of 0.90 for all items. The internal consistency for each individual factor was also calculated, yielding values of $\alpha = 0.90$ for Factor 1, $\alpha = 0.93$ for Factor 2, and $\alpha = 0.89$ for Factor 3. After this last analysis, no extra items needed to be deleted from the dataset because the internal consistency would drop when deleting items (Appendix F).

Descriptive Statistics per Factor

The subsequent tables (Table 5, Table 6, and Table 7) provide the descriptive statistics for the final STCCLQ, broken down by factor. The standard deviation can be employed to quantify the extent of variation in students' tendency within each item. Furthermore, to assess whether students generally favor CL or CoL for specific items and factors, a comparison can be made between the means of items 1 and items 2. Whereby item 1 emphasizes CL, while item 2 centers on CoL.

Table 5
Descriptive Statistics STCCLQ Items Factor 1

STCCLQ Items	M	Mdn	SD
Q1.1	5.99	6.00	.99
Q1.2	5.25	6.00	1.53
Q2.1	5.03	5.00	1.07
Q2.2	3.53	3.00	1.50
Q4.1	5.61	6.00	1.11
Q4.2	4.22	5.00	1.68
Q7.1	5.72	6.00	.78
Q7.2	3.54	3.00	1.51
Q9.1	4.55	5.00	1.78
Q9.2	3.93	4.00	1.78
Q15.1	5.45	6.00	1.36
Q15.2	5.26	6.00	1.33
Q16.1	5.44	6.00	1.08
Q16.2	3.52	3.00	1.61
Q18.1	3.84	4.00	1.62
Q18.2	4.53	5.00	1.52
Q23.1	5.74	6.00	.82

Q23.2	3.06	3.00	1.53

Table 6
Descriptive Statistics STCCLQ Items Factor 2

STCCLQ Items	M	Mdn	SD
Q11.1	4.64	5.00	1.67
Q11.2	3.56	3.00	1.60
Q25.1	3.99	4.00	1.80
Q25.2	3.72	4.00	1.62

Table 7
Descriptive Statistics STCCLQ Items Factor 3

STCCLQ Items	Mean	Mdn	SD
Q5.1	2.94	2.00	1.55
Q5.2	5.40	6.00	1.20
Q6.1	4.75	5.00	1.37
Q6.2	4.20	4.00	1.60
Q19.1	3.19	3.00	1.54
Q19.2	5.08	5.00	1.42

Conclusion

In the introduction, it was mentioned that CL and CoL are two distinct approaches to small-group learning (Paulus, 2005), each with different characteristics and goals (Oxford, 2011). CL aims to collectively build knowledge (Davidson & Major, 2014), while CoL aims to optimize individual and group learning outcomes (Lehtinen et al., 1998; Johnson, 1991; Slavin, 2010).

Distinction between CL and CoL Items

The distinctions between the two small-group learning approaches become apparent during current study when examining the factor loadings in the factor analysis. Factor loadings signify the degree of correlation between an item and the underlying factor it is intended to measure (Tavakol & Wetzel, 2020). Items with negative loadings measure the opposite end of the intended construct, so for every paired item, one has a positive factor loading while the other has a negative factor loading, indicating that they measure the factor in opposing ways. The opposition of the factor loadings between the CL and CoL items is consistent with the literature which states that CL and CoL have different characteristics.

Distinction between Opposing and Different Item Pairs

During the development of the questionnaire, pairs of items (Q2, Q4, Q5, Q6, Q7, Q11, Q16, Q18, Q19, Q23, Q25) were formulated in an opposing manner (O) to each other, and other item pairs (Q1, Q9, Q15) could receive both high or low rankings (D). Examining the factor loadings of the item pairs labeled with D, it becomes evident that these pairs exhibit the weakest factor loadings among all the items in the final STCCLQ. The lower factor loadings indicate a weaker correlation between the D items and the underlying factor it is intended to measure (Tavakol & Wetzel, 2020). This weaker correlation can be attributed to the fact that students have the flexibility to rank both items within these pairs as either low or high. Nevertheless, these D items do not differentiate as effectively from one another as compared to the opposite (O) items. Therefore, no further statements will be made about the two different types of paired items.

Labeling of Factors

By employing EFA, the latent factors that indicate students' tendency towards the distinct learning approaches were sought to uncover. The complete set of the STCCLQ items displayed strong internal consistency, and following the EFA, a conclusive three-factor solution was established encompassing all STCCLQ items. These factors emerged from the foundation of the five constructs established during the literature review in the introduction. When examining the items within these factors, it becomes evident that Factor 1 encompasses three of the constructs identified in the literature review, while Factor 2 corresponds to one construct, and Factor 3 encompasses another single construct. As a result, the factors are labelled in following way. Factor 1 captures aspects related to the "Cognitive and Interpersonal Demands" associated with small-group learning. Factor 2 encompasses "Involvement Instructor" in during groups assignments. Factor 3 delves into the "Structure" of both CL and CoL.

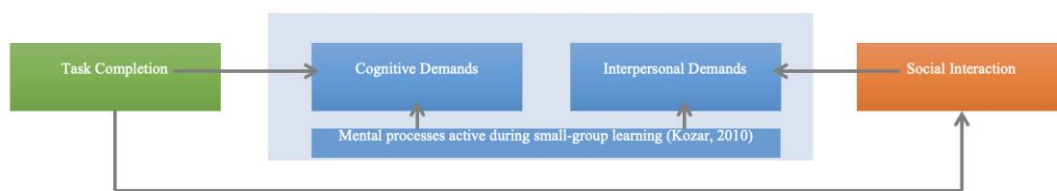***Factor 1 Cognitive and Interpersonal Demands***

The first factor is labelled as "Cognitive and Interpersonal Demands". This factor highlights the internal challenges students face when engaged in collaborative problem-solving, where the demands for cognitive processes and effective interpersonal interactions are prominent. Process that can be labelled as high level of cognitive demands are for example; explaining how to solve problems, teaching one's knowledge to others, checking for understanding, discussing concepts being learned and connecting present with past learning (Laal, 2013). These processes are typical in CL, which places an emphasis on working together

(Davidson & Major, 2014), as opposed to CoL, where the emphasis is on working with each other.

The questions that fit factor 1 are emanated from the preconceived constructs; Task Completion (Q1, Q15), Interpersonal and Cognitive Demands (Q2, Q7, Q16, Q18, Q23), and Social Interaction (Q4, Q9). The fusion from the three different constructs from the literature review to one factor can be explained by the relationship between these constructs (Figure 2).

Figure 12

Relationship between Key Concepts and Factor 1

Firstly, it is important to note that the concept of "Social Interaction," as identified in the literature review, plays a role in influencing the "Interpersonal Demands" component of Factor 1, and therefore, it has a direct correlation with Factor 1. This relationship can be understood by recognizing that "Interpersonal Demands" (a part of Factor 1) stem from the interactive nature of learning sessions, as outlined by Clark and Rutter (1981). Consequently, a higher degree of "Social Interaction" during the learning process would naturally lead to an increased level of "Interpersonal Demands" for students.

Secondly, a direct correlation also exists between the concept of "Task Completion," as identified in the literature review, and another aspect of Factor 1, namely "Cognitive Demands." In the context of CoL, task completion typically involves the division of work (Kozar, 2010; Lajoie & Derry, 2013; Paulus, 2005; Roschelle & Teasley, 1995). This division of work tends to reduce cognitive demands. On the other hand, in CL, task completion is achieved through a shared process of knowledge creation (Kozar, 2010; Lajoie & Derry, 2013; Paulus, 2005; Roschelle & Teasley, 1995). This shared knowledge creation suggests a higher level of cognitive processing, making it more cognitively demanding.

Thirdly, there exists an indirect connection between the construct "Task Completion" and "Interpersonal Demands" (part of Factor 1) through the intermediary of the construct "Social Interaction". While working with each other (CoL; Task Completion) (Davidson & Major, 2014) could lead to less "Social interaction" between students, contradictory working together (CL; Task Completion) (Davidson & Major, 2014) would lead to more "Social Interaction".

Factor 2 Involvement of Instructor

Factor 2 emphasizes the differential "Involvement of Instructors" in CL and CoL. This factor underscores the distinctive nature of the more teacher-centeredness approach in CoL and the more student-centeredness approach in CL (Panitz, 1999). The questions that fit Factor 2 in the final version of the questionnaire are all items original from the construct "Instructor Involvement" (Q11, Q25). Therefore Factor 2 is labelled as "Instructor Involvement".

Factor 3 Structure

Factor 3 elucidates the significance difference in "Structure" between CL and CoL. The items comprising this factor underscore the level of structure on students' tendency between the two small-group learning approaches. Where CoL is characterized by highly structured nature of the tasks (Millis, 2002; Oxford, 1997; Panitz, 1999), less structured tasks for more elaborated dialogue is characteristic for CL (Cohen, 1994; Rose, 2004). The questions that fit Factor 3 in the final version of the questionnaire are all original items from the construct "Structure" (Q5, Q6, Q19) and therefore Factor 3 is labelled as "Structure".

Discussion

In current study, a questionnaire is designed to indicate students' inclination between CL and CoL. The findings presented in this discussion shed light on the implications for practices, the scientific relevance of the STCCLQ and potential avenues for future research.

Practical Implications

The STCCLQ can be utilized by instructors as a valuable tool prior to assigning group assignments to students, rendering this questionnaire highly practical. At the commencement of a course, instructors can employ this tool and request students to complete the questionnaire. Subsequently, students' inclinations towards specific small-group learning approaches in three distinct factors will manifest. As mentioned in the introduction of this paper, the insights derived from this questionnaire can prove for instructors whether students are approaching assignments correctly in alignment with the learning goals. In cases where this is not the scenario, instructors have the option of providing additional instruction to students on employing the correct small-group learning approach or offering supplementary guidance during the assignment.

While the three factors highlight distinctions in "Cognitive and Interpersonal Demands," "Instructor Involvement," and "Structure," the added support that instructors can offer to steer

students towards the most suitable small-group learning approach can be more customized per factor.

For example, the STCCLQ reveals that students' inclinations for the small-group learning approach align with the assignment's learning objectives for Factor 2 (Instructor Involvement) and Factor 3 (Structure). However, this alignment is not seen for Factor 1 (Cognitive and Interpersonal Demands). In response, instructors can utilize this information to guide students in adopting the desired small-group learning approach for Factor 1 as well. To be more precise, in situations where there is a need for higher "Cognitive and Interpersonal Demands" but students tend not to lean in that direction, it is recommended that instructors employ a conceptualization scaffold. This systematic instructional approach offers temporary guidance to students as they engage in challenging tasks or problem-solving activities (DiNapoli & Miller, 2022). Another method for instructors to provide in Factor 1 involves the use of enabling prompts. These prompts may involve simplifying the number of steps, reducing the complexity of numerical aspects, or varying the forms of representation (Sullivan et al., 2009).

Regarding Factors 2 and 3, which pertain to "Instructor Involvement" and "Structure," when these aspects of the intended small-group learning approach do not align with students' inclinations, it is recommended to furnish detailed instructions about the assignment in advance. This approach assists students in developing a clearer understanding of the expected approach during group assignments. It also indicates to students that when students they seek a different level of instructor involvement or structure, the original learning goals of the group assignment may not be fully met.

Scientific Relevance

In addition to its practical implications, this research also makes a noteworthy contribution to the scientific domain. In the literature review, five distinct components were employed to compare CL and CoL. Following factor analyses, three distinct factors emerged. This suggests that the novel scientific insights garnered from this research reveal that these small-group learning approaches encompass three distinct components, namely "Cognitive and Interpersonal Demands", "Instructor Involvement", and "Structure". These components can serve as well-defined characteristics and can be employed in future research to compare various small-group learning approaches with one another.

Added to this, the newly developed STCCLQ is an unique contribution to the scientific field of small-group learning research as already mentioned in the introduction. Before the development of the STCCLQ, a clear gap in the literature was indicated. A questionnaire for

comparing two small-group learning approaches CL and CoL especially concerning students' inclinations before starting assignments was still missing.

Which should be appropriately acknowledges is that in current study, the subsequent validation of the final STCCLQ questionnaire is missing due to the lack of participants. For follow-up studies or replication studies, subsequent validation is recommended according to Tsang et al. (2017).

Future research

While the current study provides valuable insights into the factors that indicate students' inclination towards CL and CoL and the practical use of this information for instructors, several added avenues for further research merit exploration. To begin, future research could involve the development and testing of a visualization tool for presenting the questionnaire results to instructors. This visualization could effectively identify the tendency of individual students towards the two approaches, breaking down their scores across different factors. Additionally, the visualization could include recommendations for guidance that instructors might offer to these students based on their questionnaire responses. In order to give those guidance recommendations per different factor to the instructor, a database with small-group learning guidance options need to be created.

Additionally, conducting longitudinal studies could lead to a better understanding of the stability of these inclinations over time and how students' tendencies may change in response to external factors, such as their experiences with group work. It is important to recognize that students' tendencies toward small-group learning approaches are rooted in their internal scripts (as outlined by Carmien, et al., 2007). However, utilizing different methods of small-group learning may alter these internal scripts and, consequently, impact students' tendencies for small-group learning. To gain deeper insights into these hypotheses, conducting further research in the field of small-group learning is highly recommended.

Concludingly, this study presents a questionnaire that provides insights into the inclinations of students regarding CL and CoL. At the outset of a group assigment, instructors can employ the STCCLQ to collect students' responses, enabling them to determine whether students' small-group learning approaches align with the learning goals. In cases where alignment is lacking, instructors can offer tailored guidance to help students adopt the correct small-group learning approach or provide additional support during assignments. Given that the STCCLQ is divided after EFA into the following three factors, namely cognitive and

interpersonal demands, instructor involvement and structure, any additional instructions and guidance can be modified to the specific factor requiring it.

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Appendix A
Informed Consent

Information about the study
Researcher and contact person: Sara de Bruin, s.r.m.debruin@student.utwente.nl

Introduction
I ask you to participate in a research study. Participation is voluntary, joining requires your explicit active consent. Please read the following information carefully before you make your decision. You are welcome to ask for more information and clarification from the researcher.

Description and Purpose of the Study
The focus of this study is on the development of a questionnaire. The purpose of this questionnaire is to determine whether collaborative learning or cooperative learning is the most convenient approach for university students when working on group assignments. Your consent to participate in the study will allow the researcher to access and analyse your data for the research purpose mentioned above.

What is expected of you?
Your participation in the study means that you will fill in one questionnaire with a focus on collaborative and cooperative learning. The expected time to fill in the questionnaire will be 10 minutes. You voluntarily participate in this research. Therefore, at any time during the study, you can stop participating and withdraw your consent. You do not have to indicate why you are stopping.

What happens with my data?
The research data we collect in this study will be used by the researcher for the dataset and the paper for this Master Thesis.

Do you have questions about the research?
If you would like more information about the research or you have a complaint or comment about it, you can contact Sara de Bruin, at s.r.m.debruin@student.utwente.nl.

Declaration of Consent
By ticking the following check box and clicking the submit button, you acknowledge that you have read the above information carefully and that you give your consent to participate in the described study.

Questionnaire Casus

The cases that were used in the questionnaire are written down below.

The first questions are about this case. The case represents a group assignment at University. Please read the case first and answer the questions afterwards.

Case 1:

At the beginning of the new course Academic Writing, you receive a project that you need to work on with three other students. The assignment is presented during the first lecture. The group you need to work with is also presented during the first lecture.

Task:

You need to write an English academic argumentation paper about a subject of your own choice in 4 weeks. This paper needs to contain two pro-arguments that support your viewpoint and one counterargument. You will receive information about the correct way to write academically in the upcoming lectures.

Learning Goals: (*ACADEMIC WRITING; 10 Features of Academic Writing Style*, n.d.)

At the end of the course...

- The students are skilled in writing a formal paper, which can be checked in the academic words chosen by the students.
- The students are skilled in writing a paper with correct grammar structures.
- The students are skilled in writing a paper with clear and definite statements.
- The students are skilled in writing a paper with impersonal language instead of "I think/I feel".
- The students are skilled in writing a precise paper with concise, clear, and accurate statements instead of vague or ambiguous statements.
- The students are skilled in writing a paper including correct references following the APA format.
- The students are skilled in writing a paper with transition words included.

The following questions should be completed keeping in mind that you are working on this assignment. Choose the option you would normally use during group work and try

to avoid the

socially desirable options.

Case 2:

The last questions are about this case. The case represents a group assignment at University. Please read the case first and answer the questions afterwards.

Case 2:

At the beginning of the new course Professional Development, you receive a project that you need to work on with two other students. The assignment is presented during the first lecture, you need to create your own groups after the first lecture.

Task: You need to design a poster which contains four different jobs you could do after graduation in a group of three students with the upcoming deadline in three weeks. To make this poster, four different interviews must be done. You will receive information about the correct way to design an academic poster and the right way to conduct interviews during the lectures.

Learning Goals: (*A Short Guide for Conducting Research Interviews*, 2014; Gundogan et al., 2016)

At the end of the course...

- The students can design an interview introduction, which contains the purpose of the research, how the information will be used and the length of the interview.
- The students can create clear interview questions without bias or assumptions.
- The students can conduct an ethically correct interview, which includes informed consent of the person that was interviewed and confidential handling of the audio recordings.
- The students are skilled in designing an academic poster with contrasting backgrounds and a logical information flow format.
- The students are skilled to use logical headings in their academic poster.
- The students are skilled to write the main body part of their academic poster in a simple abstract outline, with no more than 100 words per section.

The following questions should be completed keeping in mind that you are working on

this assignment. Choose the option you would normally use during group work and try to avoid the socially desirable options.

First version Questionnaire STCCLQ (Think-aloud Version)

What university are you studying at?

- University Maastricht
- Radboud University Nijmegen
- University Tilburg
- University Leiden
- University Maastricht
- Erasmus University Rotterdam
- University Twente
- University Utrecht
- University Amsterdam
- VU Amsterdam
- University Delft
- University Eindhoven
- University Wageningen
- Other

What academic year are you in now?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- Other

What program are you following now?

- Bachelor

- Pre-master

- Master

- Other

In which field of study are you studying?

- Economic
- Behaviour and society
- Health
- Interdisciplinary
- Agriculture and nature
- Law
- Language, art, and culture
- Technology
- Other

Do you have any experience with working in a group on an assignment?

Research Questions

Task Completion

STCCLQ- items	Item-Relation Opposite/ Different	Seven-point Likert scale						
		StD	D	SoD	N	SoA	A	StA
1.A We work together on parts of this assignments. 1.B We work separately on parts of this assignment.	D							
2.A We challenge each other's ideas or reasoning, to come up with better solutions during this assignment. 2.B We challenge our self to come up with good reasoning and ideas for a part of this assignment that we work on.	D							
3.A We provide needed feedback and comment to each other for the best interest of this assignment. 3.B We provide feedback and comments to the whole assignment after we connected all the different pieces of every student together.	D							
4.A During the weeks, we meet up a couple time to work on the assignment together. 4.B During the weeks, we meet up to split up the assignment, and to check how we are doing on our parts.	D							
5.A We mainly work together on this assignment. 5.B We mainly work on this assignment for ourselves.	O							
6.A When submitting this assignment, we are aware of all information in the assignment	D							

because we have prepared the information together.

6.B When submitting these assignments, we are aware of all the information in the assignment because we have gone through the entire document. O

7.A During the completion of this assignment, we are mainly concerned with discussing and adjusting the aspects of the assignment that are not yet running smoothly.
7.B During the completion of this assignment, we are mainly concerned with combining the various parts from the assignment and writing a creating a whole.

Interpersonal and Cognitive Demands

STCCLQ- items	Item-Relation Opposite/ Different	Seven-point Likert scale						
		StD	D	SoD	N	SoA	A	StA
8.A If my fellow student is not feeling well, I will notice this while working on this group assignment.	O							
8.B If my fellow student is not feeling well while working on the group assignment, I will not notice.	O							
9.A While working on this group assignment, I automatically realize how my fellow students are doing regarding the group assignment.								
9.B While working on this group assignment, I don't know exactly how far my fellow students are on this assignment.	D							
10.A During this assignment, I have close contact and interaction with my fellow students.								
10.B During these assignments, I can contact my fellow students when necessary.	O							

STCCLQ- items	Item-Relation Opposite/Different	Seven-point Likert scale

11.A I have the concept of the whole task clear in my head when working this assignment.
11.B The concept of a specific part of the assignment is clear in my head, but I do not have a broad concept with connections of the whole assignment. — O

12.A After handing in this assignment, I could perform it again within a different subject and another group.
12.B After handing in this assignment, I am not exactly sure how to perform it again in with other students in another subject. — D

13.A While working on this assignment, I will do my best to understand my fellow student's thinking about the subject.
13.B While working on this assignment, I will mainly use my own way of thinking about the subject. — O

14.A While working on this assignment I will try to make sense of all the information in our assignment.
14.B While working on this assignment, I won't worry too much if I don't fully understand a section that my fellow student has mastered — (no code)

Structure

STCCLQ- items	Item-Relation Opposite/Different	Seven-point Likert scale						
		StD	D	SoD	N	SoA	A	StA

15.A At the beginning of this assignment we do not establish a clear structure about how we will shape the entire assignment.
15.B At the start of the assignment, we agree on a format that we use as the structure of our assignment. — O

16.A At the start of this assignment, we will not draw up a clear schedule for the course of — O

the assignment except from the deadline that is already established.

16.B At the start of this assignment, we make a schedule in which it is clear to everyone when what needs to be finished.

D

17.A While working on this assignment, I feel that I have a lot of freedom for the interpretation of the assignment.

17.B While working on this assignment I feel that I have a lot of structure and know exactly in which direction I need to work.

18.A The end result of the assignment will probably not be the same as the end result I now expect.

O

18.B The expected image of the end result will largely correspond to the final end result of this assignment.

19.A While working on this assignment, I try to let go of my own structures of previous assignments as much as possible and to include the experience of fellow students during this assignment.

O

19.B While working on this assignment I use my experiences from other group assignments and try to implement them in this assignment.

O

20.A While working on this assignment I sometimes feel a bit lost as I don't have a clear direction.

20.B While working on this assignment I have a clear direction. Therefore, I know exactly what I am doing.

Social Interaction

STCCLQ- items	Item-Relation Opposite/Different	Seven-point Likert scale						
		StD	D	SoD	N	SoA	A	StA

STCCLQ- items	Item-Relation Opposite/Different	
21.A I ask my fellow students questions related to the content this group assignment. 21.B I ask few or no questions to my fellow students about the content of this group assignment.	O	
22.A While working, discussions will take place with my fellow students about the content of this group assignment. 22.B While working, we will not discuss about the content of this group assignment.	O	
23.A When we are working on the group assignment, we sit together (online or offline). 23.B When we are working on the group assignment, we are separate from each other.	D	
24.A While working on this group assignment, I try to understand how my fellow student thinks about a certain topic. 24.B While working on this group assignment, I will only use my own knowledge on a particular topic.	O	
25.A I expect that at the end of this assignment I will have learned new things, particular from my fellow students. 25.B I expect that at the end of this assignment I will have learned new things, particular from the literature and the lectures.	O	

Involvement Instructor

STCCLQ- items	Item-Relation Opposite/Different	Seven-point Likert scale						
		StD	D	SoD	N	SoA	A	StA
26.A If I have questions related to the group assignment, I will tend to ask my fellow students. 26.B If I have questions related to the group assignment, I will tend to ask my teacher.	D							
27.A During the assignment I expect the teacher to let us do our own thing.	D							

27.B During the group assignment, I assume
that the teacher will keep an eye on us.

28.A During the group assignment, I expected
to have no contact with the teacher about the   O
progress of our assignment.
28.B During the group assignment I assume
that the teacher expects an update every now
and then in which we indicate how far we are.

29.A Together with my fellow students, I feel
full responsibility for this group assignment.   D
29.B For this group assignment, I feel that the
teacher contributes shared responsibility.

Note. Numbering in this Appendix is different than the Appendix D and X.
Likert-scale options are represented by the following abbreviations, along with their
respective meanings: Strongly Disagree (StD), Disagree (D), Somewhat Disagree (SoD),
Neutral (N), Somewhat Agree (SoA), Agree (A), Strongly Agree (StA).
Every A item is focused on CL, and every B item is focused on CoL.

Pilot Version Questionnaire STCCLQ

General Questions

What university are you studying at?

- University of Maastricht
- Radboud University of Nijmegen
- University of Tilburg
- University of Leiden
- University of Maastricht
- Erasmus University of Rotterdam
- University of Twente
- University of Utrecht
- University of Amsterdam
- VU of Amsterdam
- University of Delft
- University of Eindhoven
- University of Wageningen
- Other...

What academic year are you in now?
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- Other

What program are you following now?
- Bachelor
- Pre-master
- Master
- Other

In which field of study are you studying?
- Economic
- Behaviour and society
- Health
- Interdisciplinary
- Agriculture and nature
- Law
- Language, art, and culture
- Technology

- Other

Do you have any experience with working in a group on an assignment?

- Yes
- No

Research Questions

Task completion

STCCLQ- items	Seven-point Likert scale						
	StD	D	SoD	N	SoA	A	StA
Q1.1 Together with my team members, I brainstorm about the pro-arguments and counterarguments. Q1.2. The arguments will be divided among the groups members and worked on separately. Q13.1. I challenge the entire group to come up with ideas, while designing an academic poster. Q13.2. I challenge myself to come up with ideas, while designing an academic poster. Q15.1. During the weeks, we meet up a couple times to prepare the interviews and design the poster together. Q15.2.1. During the weeks, we meet up to split up the different parts of this assignment and to check how we are doing on our parts. Q17.1. After handing in this paper, I acquired the skills to conduct interviews and to create academic posters. Q17.2. After handing in this paper, I only acquired one of the skills (performing an interview and/or designing an academic poster).							

Interpersonal and Cognitive Demands

STCCLQ- items	Seven-point Likert scale

	StD	D	SoD	N	SoA	A	StA

Q2.1. While working on this group assignment, I am aware of the progress of my fellow students on this assignment.

Q2.2 While working on this group assignment, I don't know exactly how far my fellow students are on this assignment.

Q7.1. While working on this assignment, I try to include ideas from fellow students.

Q7.2. While working on this assignment I focus mainly on my own ideas.

Q16.1. During this assignment, I have close contact with my fellow students.

Q16.2. During this assignment, I contact my fellow students only when necessary.

Q18.1. While working on this assignment I feel the need to master all the (sub) skills that are needed to meet the final criteria.

Q18.2. While working on this assignment, I do not worry too much about mastering the (sub) skills if the groups meet the final criteria.

Q23.1. While working on the poster, I try to understand how my fellow students want to design it.

Q23.2. While working on the poster, I will mainly use my own preference in the design of the poster.

Structure

STCCLQ- items	Seven-point Likert scale

	StD	D	SoD	N	SoA	A	StA

Q3.1. I have a conceptualisation of the viewpoint, arguments, counterarguments and conclusion in my head when working on this assignment.

Q3.2. The concept of a specific part of the assignment (for example the counterargument) is clear in my head, but I do not have a complete conceptualisation with connections between viewpoint, arguments, and counterarguments.

Q5.1. At the beginning of this assignment, my team members and I will not establish a clear structure about how we will shape the entire paper.
Q5.2. At the start of the assignment, my team members and I agree on a format that we use as the structure of our paper.

Q6.1. While working within the boundaries of this assignment, I go with the flow and see how the process develops over time.
Q6.2. While working within the boundaries of this assignment, I created a lot of structure for myself and work according a clear and predetermined plan.

Q19.1. When working towards the end product (the poster) we will not draw up a clear schedule except from the deadline that is already established.
Q19.2. At the start of this assignment, we make a schedule in which it is clear to everyone when what needs to be finished.

Q20.1. How I envision the poster at the beginning of the project will probably deviate from the end product.
Q20.2. How I envision the poster at the beginning of the project will probably largely correspond to the end product.

Q21.1. How I envision the poster at the beginning of the project will probably largely correspond to the end product.
Q21.2. While working on this assignment I have a clear direction. Therefore, I know exactly what I am doing.

Social Interaction

STCCLQ- items	Seven-point Likert scale						
	StD	D	SoD	N	SoA	A	StA
Q4. 1. While working on this assignment, I will do my best to understand my fellow student's view on the subject. Q4.2. While working on this assignment, I will mainly focus on my own understanding of the subject.							
Q8.1. When I have questions related to the subject of this assignment, I first ask my fellow students.							

Q8.2. When I have questions related to the subject of this assignment, I first search for the answer myself.

Q9.1. When we are working on the group assignment, I prefer to sit together (online or offline).
Q9.2. When we are working on the group assignment, I prefer to do this separate from each other.

Q10.1. I expect that at the end of this assignment I will have learned new things about academic writing, particular from the discussions with my fellow students.
Q10.2. I expect that at the end of this assignment I will have learned new things about academic writing, particular from the lectures.

Q14.1. Within my team we work together at the same part of this poster at the same time and place.
Q14.1. Within my team we work separately on different parts of this poster.

Q21.1. While preparing the interviews, discussions will take place with my fellow students about the content of the interviews.
Q21.2. While working on the preparation of the interviews, we will not discuss that much about the interviews.

Involvement Instructor

STCCLQ- items	Seven-point Likert scale						
	StD	D	SoD	N	SoA	A	StA
Q11.1. I expect the teacher does not check our progress during the writing assignment.							
Q11.2. When writing this paper, I assume that the teacher will keep an eye on our progress.							
Q12.1 I feel full shared responsibility in our team for the quality of our paper.							
Q12.2. I feel that the teacher should actively supports and nurtures the process to enhance the quality of our paper.							
Q24.1. If I have questions about the best way to approach people for an interview, I will tend to ask my fellow students.							

Q24.2. If I have questions about the best way to approach people for an interview, I will tend to ask my teacher.

Q25.1. During the group assignment, I expect to have no contact with the teacher about the progress of the interviews.
Q25.2. During the group assignment I assume that the teacher expects an update every now and then in which we indicate how many people we already interviewed.

Note. Likert-scale options are represented by the following abbreviations, along with their respective meanings: Strongly Disagree (StD), Disagree (D), Somewhat Disagree (SoD), Neutral (N), Somewhat Agree (SoA), Agree (A), Strongly Agree (StA).
Every A item is focused on CL, and every B item is focused on CoL.

Appendix E

Final Version Questionnaire PCCLQ

Factor 1 Cognitive and Interpersonal Demands

STCCLQ- items	Item-Relation Opposite/ Different	Seven-point Likert scale						
		StD	D	SoD	N	SoA	A	StA
Q1.1 Together with my team members, I brainstorm about the pro-arguments and counterarguments. Q1.2. The arguments will be divided among the groups members and worked on separately.	D							
Q2.1. While working on this group assignment, I am aware of the progress of my fellow students on this assignment. Q2.2 While working on this group assignment, I don't know exactly how far my fellow students are on this assignment.	O							
Q4.1. While working on this assignment, I will do my best to understand my fellow student's view on the subject. Q4.2. While working on this assignment, I will mainly focus on my own understanding of the subject	O							
Q7.1. While working on this assignment, I try to include ideas from fellow students. Q7.2. While working on this assignment I focus mainly on my own ideas.	O							
Q9.1. When we are working on the group assignment, I prefer to sit together (online or offline). Q9.2. When we are working on the group assignment, I prefer to do this separate from each other.	D							
	D							

Q15.1. During the weeks, we meet up a couple times to prepare the interviews and design the poster together.

Q15.1. During the weeks, we meet up to split up the different parts of this assignment and to check how we are doing on our parts.   O

Q16.1. During this assignment, I have close contact with my fellow students.

Q16.2. During this assignment, I contact my fellow students only when necessary.   O

Q18.1. While working on this assignment I feel the need to master all the (sub) skills that are needed to meet the final criteria.

Q18.2. While working on this assignment, I do not worry too much about mastering the (sub) skills if the groups meet the final criteria.   O

Q23.1. While working on the poster, I try to understand how my fellow students want to design it.

Q23.2. While working on the poster, I will mainly use my own preference in the design of the poster.

Factor 2 (Involvement Instructor)

STCCLQ- items	Seven-point Likert scale						
	StD	D	SoD	N	SoA	A	StA
Q11.1. I expect the teacher does not check our progress during the writing assignment.							
Q11.2. When writing this paper, I assume that the teacher will keep an eye on our progress. O							
Q25.1. During the group assignment, I expect to have no contact with the teacher about the progress of the interviews.							
Q25.2. During the group assignment I assume that the teacher expects an update every now and then in which we indicate how many people we already interviewed. O							

Factor 3 (Structure)

STCCLQ- items	Seven-point Likert scale						
	St D	D	SoD	N	So A	A	St A
Q5.1. At the beginning of this assignment, my team members and I will not establish a clear structure about how we will shape the entire paper.	O						
Q5.2. At the start of the assignment, my team members and I agree on a format that we use as the structure of our paper.							
Q6.1. While working within the boundaries of this assignment, I go with the flow and see how the process develops over time.							
Q6.2. While working within the boundaries of this assignment, I created a lot of structure for myself and work according a clear and predetermined plan.	O						
Q19.1. When working towards the end product (the poster) we will not draw up a clear schedule except from the deadline that is already established.	O						
Q19.2. At the start of this assignment, we make a schedule in which it is clear to everyone when what needs to be finished							

Note. Likert-scale options are represented by the following abbreviations, along with their respective meanings: Strongly Disagree (StD), Disagree (D), Somewhat Disagree (SoD), Neutral (N), Somewhat Agree (SoA), Agree (A), Strongly Agree (StA).
Every A item is focused on CL, and every B item is focused on CoL.

Appendix F

Residual score reliability questionnaire

STCCLQ- items	Cronbach's Alpha when Item Deleted
Q1_1	.85
Q1_2	.86
Q2_1	.85
Q2_2	.85
Q4_1	.85
Q4_2	.85
Q5_1	.85
Q5_2	.85
Q6_1	.86
Q6_2	.86
Q7_1	.85
Q7_2	.85
Q9_1	.85
Q9_2	.85
Q11_1	.85
Q11_2	.85
Q15_1	.85
Q15_2	.85
Q16_1	.85
Q16_2	.85
Q18_1	.85
Q18_2	.85
Q19_1	.86
Q19_2	.85
Q23_1	.85
Q23_2	.85
Q25_1	.85
Q25_2	.85