Master Thesis

Investigating the Effectiveness of Structured and Scripted Collaborative Learning in an Indian Education Context

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Abstract

Learning outcomes in collaborative learning can be improved by providing concrete task-based guidance and support in group interactions. In this research, the Jigsaw method is used to structure students' collaboration activities. In addition, students in the experimental condition are supported with scripted worksheets that consist of the sequence of collaboration activities and example questions for provoking information from their peers. An intervention consisting of three English language lessons for students of grade eight in an Indian school was conducted. Differences in students' learning outcomes and experiences of collaboration were observed and compared between an experimental condition (n = 25) which received scripts in heterogeneous groups and a control condition (n = 27) which consisted of heterogeneous groups that did not receive scripts. This study initiated the application of a novel learning method in an Indian secondary school. While the findings indicate no significant differences in the learning outcomes and perceptions of collaboration between the two conditions, it was observed that participating students were well accepting of this newly implemented method of learning. Students' responses pertaining to their experiences of collaboration were largely positive, indicating that they were adapting to learning in collaborative groups. As a matter of fact, qualitative analysis reveals that students in both conditions engaged in domain related discussions. Findings from this study point out the acceptance of collaborative learning in an Indian educational context; which suggests the scope for further research in implementing collaborative learning initiatives and investigating the necessary support required to improve students' learning outcomes, teamwork and social skills.

Keywords: Collaborative Learning, Collaborative Scripts, Heterogeneous Grouping, Jigsaw Method.

Introduction

In recent years collaborative learning has gained immense recognition as an effective instructional tool. Research shows numerous positive results in the success of collaborative learning as a tool to increase students' learning outcomes (Laal & Ghodsi, 2012; Lou, Abrami, Spence, Poulson, Chambers, & Apollonia, 1996; Kyndt, Raes, Lismont, Timmers, Cascallar & Dochy, 2013). Meta analyses have advocated that collaborative learning can be effective at all educational levels (Kyndt et al., 2013). While collaborative learning is a commonly used instructional strategy across many countries in the west, it is still a novel concept being adapted in certain countries (Zheng, Yang, Cheng & Huang, 2014). For example, in the context of the Indian education system, there is an emphasis on individual achievement (Mehrotra, Khunyakari, Natrajan & Chunawala, 2009) and it is a common classroom practice for students to be passive listeners while the teacher conducts lessons (Rajkhowa & Das, 2015). However, realising the needs of the developing Indian society, the need to train students in social skills, teamwork, and communication has been stressed greatly in recent years (Mehrotra et al., 2009); and while some collaborative learning initiatives are being implemented (Burns, Pierson & Reddy, 2014; Bhowmik 2016), there is a need for more research in understanding the effects of collaborative learning in the Indian context.

Collaborative learning can be defined as students working together to achieve common goals that are important to not only the individual but also to the other members of the group (Krol, Janssen, Veenman & van der Linden, 2004). Such a learning environment creates the idea that students are only able to achieve their goals in cooperation with other group members. Research has pointed out that collaborative learning can be successful in promoting academic performance (Le, Janssen & Wubbels, 2018) since it requires learners to elaborate, share and

communicate their reasoning which in turn fosters new knowledge construction (Saab, van Joolingen & van Hout-Wolters, 2007). Supporting studies have shown that students learning in small groups have significantly greater learning outcomes than students who work individually (Lou et al., 1996), as the active exchange of ideas within a small group stimulates students' critical thinking skills (Laal & Ghodsi, 2012).

However, collaborative processes may not always be successful when students are simply put together in a group, because when students are instructed to work together, there may be no understanding of how to have group discussions or about the purpose of the discussion itself (Johnson & Johnson, 2002, Mercer et al., 2004). On the one hand, certain group members may do most of the work while other group members may be "free-riders" that do not contribute to the task at hand; on the other hand, some group members may prefer to work individually, without any help from their peers (Saab, van Joolingen & van Hout-Wolters, 2007). Therefore, to ensure that students' collaboration would lead to effective knowledge construction, Johnson and Johnson (1999, 2002) stated that five basic factors must be present in a collaborative group. These factors include positive interdependence between group members, individual accountability of each group member, face-to-face promotive interaction within the group, social skills of students and group processing that includes reflection on a group session. Integrating these factors in a collaborative learning environment allows for anticipating and solving problems, such as the ones mentioned above, that students may face while working in a group (Johnson & Johnson, 1999).

Research agrees that collaboration skills influence students' learning outcomes (Johnson & Johnson, 1999, 2002; Le, Janssen & Wubbels, 2018; Mercer et al., 2004 & Ross, 2008). For instance, it has been pointed out that the quality of students' explanations during group

discussions could often be below a level that enables shared knowledge construction (Le, Janssen & Wubbels, 2018). In order for collaborative learning to promote learning outcomes, students must have or must be taught the necessary social skills required to hold high quality group discussions (Ross, 2008). In order to ensure that students participate in domain related discussions and know what is expected of them while collaborating with their peers, their collaborative activities need to be supported with concrete guidance on the type of tasks and division of responsibility. (Noroozi, Weinberger, Biemans, Mulder & Chizari 2013).

Another vital factor that could influence the success of collaborative learning in classrooms is that of the group composition (Wang & Lin, 2007). It has been noted that homogeneous groups may be good at achieving certain goals; however, heterogeneous groups based on students' abilities could outperform homogeneous groups (Gogoulou, Gouli, Boas, Liakou & Grigoriadou, 2007; Wang & Lin, 2007). When students of various ability levels (high, average and low) are present in a group, it is noted that high ability students give explanations to their low ability peers (Saleh, Lazonder & de Jong, 2007). In the process of providing explanations, high ability students develop their cognitive processing abilities while low ability students benefit from their help (Saleh, Lazonder & de Jong, 2007; Schmitz & Winskel, 2008; Tutty & Klein, 2008). Average ability students also show positive learning outcomes from structured collaboration (Saleh, Lazonder & de Jong, 2007). Apart from the benefits of heterogeneous grouping, research has also suggested that in mixed ability groups, high ability students may dominate the discussion while low ability students stay merely on the receiving end of the dialogue (van Dijk, 2017). Imbalanced participation in collaborative discussions could negatively impact students' learning outcomes (Bachour, Kaplan & Dillenbourg, 2010). Consequently, to ensure balanced participation in a collaborative group, the Jigsaw strategy

(Aronson et al., 1978) has been advocated by researchers (Mengduo & Xioling, 2010; Tantya & Sarayulis, 2007). The Jigsaw method encourages equal participation by making each student responsible for a specific sub-topic, ensuring that each student is an essential element for the completion of the assigned task (Aronson et al., 1978). By creating a learning environment wherein students understand shared responsibility and are interdependent on each other, the Jigsaw method also facilitates the factors for successful collaboration stated by Johnson & Johnson (2002).

Taken together, it can be understood that students learn from each other in a collaborative environment (Le, Janssen & Wubbels, 2018; Lou et al., 1996). However, the learning outcomes differ for students of different ability levels (Saleh, Lazonder & de Jong, 2007; Tutty & Klein, 2008). Ultimately, it is important to structure and support heterogeneous groups to ensure balanced participation and to create a learning environment that is conducive to knowledge acquisition. In order to implement such a successful collaboration, students must be supported in becoming aware of their individual responsibilities and their role in the group (van Dijk, 2017). This support can be provided through collaboration scripts as they offer detailed and explicit guidelines for small groups of learners to clarify what, when and by whom certain activities need to be executed (Noroozi et al., 2013); and provide instructions to carry out task-related interactions (Kollar, Fischer & Hesse, 2006).

The present study investigates the effects of structuring collaborative learning activities by means of heterogeneous Jigsaw groups and collaboration scripts in an Indian secondary school. As the focus of education in India is shifting towards training students in social skills, teamwork, and communication (Mehrotra et al., 2009) and towards being more student oriented (Burns, Pierson & Reddy, 2014); implementing and understanding the impact collaboration on

students' learning outcomes can be the foundation for steering instruction in this direction. This study explores the impact of structured and scripted collaboration on students' learning outcomes and experiences of collaboration. Additionally, it looks into the performance of students at all ability levels distinctly, with a focus on the low-achieving students to investigate whether the additional support provided by means of a scripted worksheet is beneficial in improving their learning outcomes.

Collaborative Learning

Collaboration between peers can encourage creative thinking and peer interaction helps students to generate new ideas (Slavin, 1996). As new conceptions of learning have emerged, researchers have realised that learning is not just cognitive but a social process; and one of the most fundamentally social forms of learning is that in which a person or a team helps an individual to learn (Salomon & Perkins, 1998). Resulting from the finding that learning is also a social process - instructional strategies that promote scenarios wherein students learn together have been widely advocated by researchers. They claim that the active exchange of ideas within small groups stimulates interest among the participants and promotes critical thinking (Laal & Ghodsi, 2012). For collaboration to be effective in promoting learning outcomes, Johnson and Johnson (2002) suggested five factors that must be present in a collaborative group; these include positive interdependence, individual accountability, promotive interaction, social skills and group processing.

The first factor is the presence of positive interdependence; which can be defined as the perception of individuals that they are linked to the other members of their group and believe that their individual success maximises when the other members of the group succeed, and vice versa

(Johnson & Johnson, 2002). This forms a vital basis for collaboration. An environment of positive interdependence fosters resource sharing, mutual support, and joint success.

Another important factor for successful collaboration is individual accountability. Individual accountability can be seen when students in a group support and encourage each other to complete the task at hand (Johnson & Johnson, 2002). Collaborative learning scenarios aim to achieve certain collective goals formed by the group. However, it is important for group members to know that their individual contributions are valued and that they cannot solely rely on the contribution of other members.

Additionally, in an effective collaborative learning environment, promotive interaction can be observed when individuals encourage and facilitate their group members' efforts to complete the tasks that would help them achieve group goals (Johnson & Johnson, 2002). Teaching a group member, solving problems collectively, discussing the concepts being learned, etc. are examples of the cognitive and interpersonal activities that occur when students promote each other's learning.

Furthermore, according to Johnson and Johnson (2002), students must be taught to learn the social skills necessary to work in small groups and used for optimal collaboration. They must also be motivated to use these skills since greater social skills of students bring out more positive relationships among group members and foster better learning outcomes (Johnson & Johnson, 2002).

Ultimately, the fifth factor, group processing refers to the reflection of member actions that were helpful or unhelpful in achieving goals and making decisions about which acts need to change or continue to improve or maintain effective working relationships amongst group members (Johnson & Johnson, 2002).

Understanding the nature of these factors is essential to help teachers understand the needs of students and the problems they face while working together (Johnson & Johnson, 2002). It is important to inculcate these factors in a collaborative group to optimize students' learning process by means of mutual resource sharing amongst group members, building upon each other's knowledge, providing mutual support and evaluating group processes (van Dijk, 2017). Especially considering the Indian education context wherein the participants of this study are being newly introduced to the concept of collaborative learning; to achieve fruitful outcomes, it is imperative to ensure that the aforementioned conditions are facilitated. Collaboration scripts can be a means of facilitating these conditions (van Dijk, 2017). Scripts can facilitate these conditions by prompting students to engage in resource sharing, making personal contributions, discussing concepts being learned, and seeking and sharing information. Therefore, in the current study, scripted worksheets are designed to facilitate the five conditions for successful collaboration.

Collaborative Scripts

Despite the overwhelmingly successful results of collaborative learning in improving students' learning outcomes, research has also pointed out that in some conditions collaboration may not be effective (Bachour, Kaplan & Dillenbourg, 2010; Blatchford, Kutnick, Baines & Galton, 2003). For instance, in the process of collaboration, students could rarely use effective interaction procedures on their own (King, 2007). They could be unaware of how to hold discussions together as a group and about the expected outcome thereafter (Le, Janssen & Wubbels, 2018). This lack of understanding could be a hindrance to the learning process (Le, Janssen & Wubbels, 2018). Stemming from the conception that students working together need support through the collaboration process (King, 2007; Noroozi et al., 2013); researchers have

found that collaboration scripts can be a means of providing the necessary support in guiding interactions (Kollar, Fischer & Hesse, 2006) and in prompting learners to stay focused on the task at hand (Weinberger, Ertl, Fischer & Mandl, 2005). Collaboration scripts positively facilitate the set of activities that they are aimed for; for instance, scripts can facilitate argumentative discourse and interaction (Noroozi et al., 2013). When groups are supported with scripts, it could also foster individual knowledge acquisition (Stegmann, Weinberger & Fischer, 2007). Along with the numerous positive applications of collaboration scripts, it can be stated that scripts could sometimes demand additional effort from the students, encouraging them to engage in activities that they would not perform otherwise (van Dijk, Gijlers & Weinberger, 2014).

The different approaches of collaboration scripts could have different outcomes; they could assign different activities to the learners and sequence their interactions (Stegmann, Weinberger & Fischer, 2007). For instance, epistemic scripts aim to guide the attention of the learners to the task at hand (Noroozi et al., 2013; Weinberger, Ertl, Fischer & Mandl, 2005). Prompting learners to focus on key tasks, would in turn, foster knowledge acquisition. Social scripts, on the other hand, specify the sequence and interaction of learners by provoking information from group members or by questioning each other; such patterns are believed to be influential in motivating elaboration activities that promote learning outcomes (Weinberger, Ertl, Fischer & Mandl, 2005). By providing scaffolds throughout the collaborative process, scripts can help students regulate their learning activities (Weinberger, 2011). Taken together, the guidance provided by scripts on sequencing interactions (Weinberger, Ertl, Fischer & Mandl, 2005), providing instructions to carry out domain based discussions (Kollar, Fischer & Hesse, 2006) and specifying the responsibilities of group members (Weinberger, 2011) can be influential in

facilitating the conditions for fruitful collaboration such as, positive interdependence, individual accountability, promotive interaction, group processing and using appropriate social skills (Johnson & Johnson, 2002).

The Jigsaw Method

The Jigsaw Method is a commonly used collaborative method which follows the approach of learners training and becoming experts on specific sub-sets of the topic before collaborative activities begin (Deiglmayr & Schalk, 2015). Application of the Jigsaw Method can facilitate the conditions for successful collaboration stated by Johnson and Johnson (2002). Since the Jigsaw Method is a collaborative learning technique that requires everyone's effort to produce an end product, it can foster an environment of positive interdependence and individual accountability. It encourages student participation in the collaborative groups and promotes an environment of increased resource sharing and individual contributions (Mengduo & Xiaoling, 2010). Similar to a jigsaw puzzle, each piece - each student's part - is essential to complete and understand the final product. Consequently, every student becomes an important element of the collaborative process (Mengduo & Xiaoling, 2010). Contrary to the traditional method of direct instruction by a teacher, the Jigsaw method divides students into smaller, independent groups (Aronson et al., 1978). Students' in a Jigsaw setting work to maximise the learning of all group members, share their resources, and provide mutual support; this fosters an environment of positive interdependence within the groups.

Students are assigned groups in a two-fold manner – firstly, their "home groups" consisting of students with different parts of the learning material. And secondly, the "expert groups" wherein students from different home groups having the same part of the learning material gather together to have an in-depth discussion and become experts on the assigned part.

Each member of the group is assigned a different part of the material being studied – which they are expected to understand and explain to their group members (Aronson et al., 1978). The next step involves all the members from different groups with the same learning material to gather together and form "expert groups". They would then discuss and gain expertise on the material. After the expert group discussion, all the members are expected to return to their home group to teach their parts to other members of their group (Aronson et al., 1978). In this collaborative process, by teaching their group members and discussing the concepts being learnt, students can engage in promotive interaction.

An important benefit of the Jigsaw Method is that it has shown to reduce students' reluctance in participating in the collaborative groups (Mengduo & Xioling, 2010; Tantya & Sarayulis, 2007). Consequently, the increased student participation is influential in increasing the students' learning outcomes (Mengduo & Xiaoling, 2010). In addition, if students coming together as a group are unaware of what is expected of them during the collaboration process (Mercer at al., 2004; Noroozi et al., 2013); the Jigsaw process ensures that students become aware of their responsibilities by assigning each individual a specific sub-task. Furthermore, in case of unbalanced participation that may occur when students collaborate (Bachour, Kaplan & Dillenbourg, 2010), the Jigsaw can be an effective strategy since it ensures each students' contribution as an essential element for the group's success.

Group Composition and Heterogeneous Grouping

The effect of collaborative work not only depends on the goal of group work and the nature of the group task but also on the composition of the group itself (Lai, 2011). When individuals work collaboratively on a task, they can build on each other's ideas and construct new knowledge and understanding; additionally, interaction amongst group members may cause

individuals to recognize discrepancies in differing ideas and justify their own positions (Webb, Troper & Fall,1995).

When students of various ability levels (high, average and low) collaborate in a group, it is noted that when high-ability students adopt the "helper" or "teacher" role, giving explanations and other kinds of help to the low-ability students, they benefit from explaining and clarifying their ideas to other group members (Saleh, Lazonder & de Jong, 2007; Schmitz & Winskel, 2008). This help from a high ability peer could cause low-ability students to learn more in heterogeneous groups than in homogeneous groups. Supporting studies have shown that low-ability students who worked with a high-ability partner, made significant learning gains (Schmitz & Winskel, 2008). Learning outcomes of high-ability students remain similar, regardless of the type of groups (Saleh, Lazonder, & de Jong, 2007). While some research has suggested that the homogeneous grouping could positively influence the learning outcomes of high ability students (Lai, 2011); it has also been observed that heterogeneous grouping promotes their academic achievement by giving them an opportunity to develop cognitive processing as they explain their own understanding to their peers (Tutty & Klein, 2008). Although some studies have also suggested that average ability students may learn better in homogeneous groups (Tutty & Klein, 2008), they may also benefit from heterogeneous grouping. For instance, a study by Saleh, Lazonder and de Jong (2007) pointed out that structuring collaborative learning in heterogeneous groups by assigning group roles and rules for helping behaviour led to positive effects on the achievements of average-ability students.

Placing students in mixed-ability groups can be pivotal in generating help-seeking behaviours (Krol et al., 2004) which promotes positive interdependence (Johnson & Johnson, 2002). It has also been observed that in mixed-ability groups, low-ability students benefit from

the social interactions involved in collaboration. Since they receive the required guidance or support from peers who are more capable, low-ability students benefit from being in groups with high-ability students (Saleh, Lazonder & de Jong 2005).

In order to use heterogeneous groups in classrooms, it is also imperative to consider the number of students involved in the classroom and the complexity of the subject matter being taught. For larger classes and complex subject matter, it is beneficial to have base groups (Johnson & Johnson, 2002). Base groups are long-term heterogeneous groups wherein it is the responsibility of the group members to provide each other with support, assistance and encouragement necessary to make academic progress. Having the social support and being held accountable by peers who strive to promote academic success plays a key role in producing greater learning outcomes (Johnson & Johnson, 2002). The present study is conducted by dividing students in heterogeneous, mixed-ability groups that sustain over an intervention of six days.

Context of Collaborative Learning in India

The Indian education system is rigid in nature and focuses greatly on individual learning (Mehrotra, Khunyakari, Natrajan & Chunawala, 2009). However, research has highlighted the importance of training students in social skills, teamwork, and communication (Mehrotra et al., 2009). Therefore, implementing a collaborative learning intervention in the present context can be a starting point for engaging students in teamwork and group communication. Additionally, it can pave way for the shift in the education system – from being individual and achievement oriented (Mehrotra at al., 2009; Srikala & Kishore, 2010) to more being student oriented (Burns, Pierson & Reddy, 2014).

Studies about the educational context in India reveal that instructional methods being used are not always student oriented. For instance, Srikala and Kishore (2010) have pointed out the educational approach in India as more achievement oriented than child oriented. Additionally, while investigating the instructional methods used in English teaching by secondary school teachers in India, a research by Rajkhowa and Das (2015) revealed that students were passive listeners in the classroom. Furthermore, this research suggested that in acquiring speaking skills, students would have liked more opportunities to talk; however, the teacher is primarily the speaker in the classroom. Across most classrooms in India, this is a commonly used method of instruction; especially since the priority of schools and teachers in India lies greatly on completion of the assigned yearly syllabus and preparing students for examinations. While the instructor explains certain concepts, students sit back, listen and take notes. Srikala and Kishore (2010) also point out that the current educational approach in India does not cater to fulfilling the needs of students at different ability levels.

However, some approaches have been made in order to shift the focus of teachers towards a more student-oriented style of teaching. A study by Burns, Pierson and Reddy (2014) involved a professional development programme for teachers in two Indian states. The theory behind this programme considered collaborative learning as a "gateway" to student-oriented instruction. At the end of their programme, the findings revealed that eighty percent of the teachers shifted their focus towards a more student-oriented instruction and engaged in implementing collaborative learning techniques on a regular basis (Burns, Pierson & Reddy, 2014). Some studies have highlighted the positive impact of collaborative learning activities in the Indian context. For instance, a study by Bhowmik (2016) suggests that the effects of collaborative learning in secondary school were significant and students enjoyed learning in

collaborative groups. These approaches, however, are not commonly undertaken in the Indian education context (Mehrotra et al., 2009). Therefore, there is a need to further investigate the implementation and effectiveness of collaborative learning in the context of the Indian education system.

This Study

The present study focuses on the combined effect of structured heterogeneous group composition and collaboration scripts on the learning outcomes of students in an Indian educational context. The Jigsaw Method is implemented in order to structure collaboration (Deiglmayr & Schalk, 2015) and ensure balanced student participation (Mengduo & Xioling, 2010); accompanied with supporting scripted worksheets to provide support in sequencing activities and engaging in task-based dialogue (Noroozi et al., 2013). This study aims to investigate if imposed collaborative scripts and group structures can result improving the learning outcomes of students in heterogeneous groups and looks into students of different ability levels distinctly. Especially the learning outcomes of low achieving students are observed to explore whether the added support provided by means of collaborative scripts can foster greater knowledge acquisition. Students are involved in open-ended tasks and discussions; therefore, scripted worksheets are used to provide additional guidance to the students (King, 2007). The scripted worksheet used in this study contributes to facilitating the conditions for successful collaboration mentioned by Johnson and Johnson (2002) by instructing students about their role and tasks in the collaborative group. It explains the tasks students are supposed to undertake – such as, reading and understanding the subtopic assigned to them, explaining their understanding of the subtopic to the group members, questioning group members when necessary and collectively discussing the concepts being learned. The use of scripted worksheets

is made in an effort to encourage balanced participation by specifying division of responsibilities and sequencing activities; and to provide additional guidance to the participants since they have no prior experience of working in a Jigsaw collaborative setting. This study involves quantitative and qualitative analyses. Therefore, research question 1 and 2 are investigated by means of quantitative analyses, while research question 3 is investigated by means of an exploratory qualitative analysis. The research questions being addressed in the study are as follows.

1) Does the combined use of collaborative scripts and structured heterogeneous groups positively influence the learning outcomes of (low-achieving) students in an Indian secondary school?
2) Do students who participate in scripted and structured collaboration perceive their collaborative learning experiences more positively than the students participating in unscripted and structured collaboration?
3) What kind of interactions can be observed in Jigsaw collaborative groups – in the scripted and structured vs unscripted and structured conditions?

In the present study, to investigate whether the use of collaborative scripts in structured heterogeneous groups has a positive influence on students' learning outcomes, the topic-based test scores will be compared. It is expected that scripted worksheets would provide additional guidance to students in the experimental condition and would lead to greater learning outcomes compared to students in the control condition. Especially in the case of low achieving students in the experimental condition, it is expected that the additional support would aid their learning process and lead to higher scores on the topic-based tests as compared to the low achieving students in the control condition. In addition, students' scores on a reflection questionnaire

pertaining to their experiences of collaboration will be compared between the two conditions. It is expected that the scripted worksheets would instruct students in turn taking and information sharing and reduce the possible conflicts that could arise due to sequencing. Therefore, it is expected that students in the experimental condition would perceive their collaboration activities more positively as compared to students in the control condition. Ultimately, in order to explore the quality of collaborative dialogue, students' interactions with their group members will be observed. These observations will then be coded according to the conditions for successful collaboration by Johnson and Johnson (2002). Pertaining to the quality of interactions, it is also expected that students in the experimental condition will experience fewer conflicts and engage in more content related discussions, ultimately contributing to better learning outcomes.

Method

Participants

The present study involved 52 students from a school in Pune, India. Students of grade 8, between the ages of 12-13 participated in the study (24 females, 28 males; M(age) = 12.82, SD = 0.707). Out of the total set of participants, 25 students were assigned the experimental condition (12 Female, 13 Male; M(age) = 12.72, SD = 0.707) and 27 students were assigned the control condition (12 Female, 15 Male; M(age) = 12.92, SD = 0). The consent of participants and their parents/guardians was gathered prior to the study by means of a consent form. This form can be found in Appendix 1. Initially, a total of 64 students were expected to participate in the study; however, 12 students were absent during the lessons and therefore, had to be excluded from the data set. These dropouts were a result of unforeseen extreme weather conditions, i.e., the floods in Pune city in the months of July and August 2019, due to which some students could not travel to the school. Additionally, while analysing students' responses on the reflection questionnaire,

some cases were excluded from the analysis due to reasons such as, a) incompletely answered questionnaires and b) patterns detected in students' responses.

Since the students were expected to collaborate in heterogeneous groups, they were divided according to ability levels - in three categories - low, average and high ability. The students were divided based on their comprehension and grammar test results from the previous semester. This was done by the class teacher prior to the study. The experimental and the control group, both, consisted of five smaller heterogeneous base groups. Each group was designed to consist of five students, out of which there would be two high ability students, two low ability students and one average ability student. While there was an attempt to divide all the groups equally, due to the absence of some students, some groups consisted of six members instead. Moreover, the absence of some students also made it challenging to maintain the same design in each group; therefore, there was also some variance in the number of high, low or average ability students within the groups.

In the school where the intervention and data collection took place, students had not experienced collaborating in the Jigsaw method earlier. These students had some experience of working in groups; however, as a part of their regular English language classes, they were accustomed to the traditional lecture approach of instruction. The teachers in the school also indicated that they have been trained to use collaborative learning methods. However, despite their keen interest in implementing collaborative learning methods, such as the Jigsaw in the classroom, they do not implement these methods often due to time constraints. As a part of this study, students were introduced to the Jigsaw method of collaboration for the first time, creating a drastic shift in their learning environment – from being passive to rather active contributors.

Therefore, students were first orientated about the classroom activities and the role they would play during the sessions.

Materials

Domain

The three lessons were designed as a part of the eighth grade English language curriculum of the participating school. Students are expected to develop the ability to elaborate on ideas and understand literary devices as a part of their curriculum. For this study, the three lessons formed a part of the poetry syllabus. The first lesson was the poem *I Wandered Lonely as a Cloud*, followed by an author study on William Wordsworth, and concluded with a last session on poetic devices used by the author in this poem. The lessons were designed pertaining to these topics as per the guidelines and advice of the participating school. The learning material consisted of the textbooks as a point of reference along with domain related information segments provided to each student in the group. Additionally, students in the experimental condition also received scripted worksheets.

For the first lesson, the poem was divided into five segments. Each segment consisted of a stanza or a part of a stanza along with its explanation. The test included five multiple choice questions and an open-ended question that asked students to elaborate on the mood of the poet in relation to this poem. In the second lesson, the various segments were based on the poet's early life, writing style, famous works, etc. The test for this topic contained five multiple choice questions and an open-ended question that asked the students to elaborate on the writing style of William Wordsworth and the various factors that have influenced it. The third and final lesson consisted of segments which included figures of speech used in the poem along with suitable examples. The test for this topic, as the first two, included multiple choice questions and an

open-ended question that required students to form their own sentences using the figures of speech studied during this lesson. The students' tests were then graded and their responses on the reflection sheet were scored as well. The following sections elaborate on the design of the information segments and scripted worksheets.

Information Segments

Each lesson was divided into smaller information segments. The information segments consisted of the sub-topics pertaining to main topic of each lesson. In order to gain a holistic understanding of the lesson topic, all group members were responsible for understanding and later explaining the segment, i.e., the sub-topic that was assigned to them. The information segments were printed on various coloured cards and numbered from 1-5. The numbers indicated the order in which students could take turns in sharing the information, which was beneficial in structuring the group discussion. The segments included explanations of key concepts to be discussed in class. Each segment also included a question at the end which was intended to direct students' attention towards the key aspects of the segment. For example, the first lesson consisted of five information segments that formed the whole lesson on the author study. This lesson was divided as follows – *Wordsworth's Early Life, Admiration for Nature, Famous Works, Romanticism and Lyrical Ballads*. Similarly, the second and third lesson were also divided into five sub-topics/information segments. The information segments used during the lessons can be found in the Appendix 2.

Collaboration Scripts

The experimental group received scripted worksheets that facilitated their interactions and gave guidelines for classroom discussion. The main aim of the scripted worksheet was to support the students' information seeking and information sharing behaviour between the group

members, and to provide precise procedural guidelines. The steps addressed in the script are as follows. The design of the scripted worksheet is elaborated in the following sections and can be found in Appendix 3.

In the first step, students are instructed to read their information segments thoroughly and to make notes as and when required. In the second step, students are instructed to gather together with students who have the same information segment. In this phase, all the students are instructed to share their understanding of the topic and question their peers. They are also instructed to make notes that would help them further their understanding of the topic and be beneficial in explaining the concept to their group members in the following group discussion. Students follow a schema for turn taking in sharing information and asking questions. They are also provided with some example questions that would help them seek clarifications from their peers. Some of the questions include - *What is meant by…?, How is … related to …?, What could be the reason for …?, Do you think … is similar/different to …?, Could you give an example of …?.*

In the third step, students are instructed to return to their heterogeneous base groups and to take turns for information sharing and questioning. Since the information segments are numbered from 1-5, they follow the numerical order of their segments and are also provided with a schema reiterating the order of turn taking. Once again, students are instructed to use some example questions when they feel the need to seek information from their group members. Following that, the fourth step is the test. In this step, the students are instructed about the test questions. They proceed to answer the test questions individually. They are also informed that the test contains questions from all the information segments, reiterating the fact that a collaborative effort is vital for individual success and vice versa. In the fifth and final step,

students are instructed to fill-in their responses to the reflection questionnaire. This marks the end of the lesson.

Topic-Based Test

Upon completion of each lesson, students were handed a topic-based test that aimed to evaluate their understanding of the topic. The test consisted of five multiple-choice questions and one open-ended question. While the multiple-choice questions help recall information, open-ended questions address essential concepts and encourage the students to engage in a complex thought process. These questions require students to do more than just memorizing facts (Badger & Thomas, 1992). Considering the fact that the curriculum is intended for students' language development and elaboration skills, open-ended questions were added to assess how well students are able to elaborate the concepts on their own. The multiple-choice questions were intended to measure how much information the students are able to recall at the end of the session. For example, in the first lesson, one of the multiple-choice questions included – *Q.) Which of William Wordsworth's following poems, is famous for his admiration of nature? a) It is a beauteous evening, calm and free; b) The Heart of a Tree; c) I Know Why the Caged Bird Sings.* Whereas, the open-ended question was as follows - *Briefly describe Wordsworth's writing style and what has influenced it* (Appendix 4) The answer to the open-ended question can be written well only when all the students in the group have discussed and shared their parts of the lesson. Thus, the open-ended question aims to test not only the students' ability to elaborate key concepts, but also provides an insight into the overall quality of group discussions.

Reflection Questionnaire

The reflection questionnaire consisted of twenty-four items for six factors. These factors included - Learning outcomes, Positive Interdependence, Promotive Interaction and Individual

Accountability as stated in Johnson & Johnson (2002). The items included statements such as – *My group members helped me when I did not understand something, I felt responsible for the end-product, In my group we supported each other's efforts to learn, I was able to learn more about the topic while working with my group,* etc (Appendix 5). On each of the twenty-four items, students were supposed to mark their response ranging from Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree. The scores were calculated in the range of 1-5 respectively. All items were positively marked and added to obtain a total score. Over the course of this study, the reflection questionnaire was used thrice, that is, at the end of every session.

Classroom Observations

The collaborative interactions between group members were observed from a group perspective. In order to gain insight into the quality of interactions within group members, their interactions pertaining to information seeking and sharing were observed. Their actions of engaging in help-seeking behaviour, using suggested questions from the scripted worksheet, speaking out of turn and interrupting their group members were also noted (Appendix 6). The observations included students' behaviours that facilitate an environment of positive interdependence, individual accountability, face-to-face promotive interaction and social skills. These behaviours include students providing support and resources to their group members by sharing information and/or personal notes; contributing on a personal level by explaining their understanding of the topic; engaging in promotive interaction by discussing concepts and solving problems collectively; and showcasing social skills by using effective questions during discussions, etc. The qualitative analysis of interactions between the experimental and control group were compared in order to understand whether the use of scripts in heterogeneous groups facilitated effective interactions between the group members.

Procedure

The initial plan for this study included a total of six lessons, with a duration of one hour each, spanning over a period of two weeks. However, due to scheduling constraints and the floods in Pune in the months of July and August 2019, the duration of the intervention was reduced to three lessons and a number of participants had to drop out. Data collection for this study was done by means of a lesson series conducted over a period of six days. Prior to their participation, students were briefed about classroom activities and given context of the research. Parental and student consent was gathered as well. Students were introduced to their groups in the first session; these groups were kept constant throughout the entire duration. Three topics were covered and each lesson was designed to be conducted in sixty minutes; the lessons were split into two sessions of thirty to forty-five minutes. The lessons were designed as a part of the school's English language curriculum and included three topics, a) The poem - *I Wandered Lonely as a Cloud* by William Wordsworth, b) Author Study on William Wordsworth, and c) Figures of Speech.

In every lesson, students followed the Jigsaw method of collaboration. Each member of the group received an information segment on different coloured cards. The information segments consisted of the sub-topics which students were expected to read and become experts on. Students were allotted ten minutes to read through their materials individually. Following the individual reading phase, students with the same information segments gathered together in expert groups. This group discussion was approximately twenty minutes long. In this phase, students had the opportunity to engage in an in-depth discussion of the pertaining information segment. They were encouraged to seek and share information from their peers and to take notes. The next phase was for students to get back together with their base groups and teach their

respective parts to their group members. This discussion was also carried out for approximately twenty minutes. For both phases, students in the experimental group were guided to discuss their parts and share information by means of a collaborative scripted worksheet. The scripted worksheet explained the flow of classroom activities and assisted students with some example questions that they could use for information seeking from their peers. On the other hand, in the control group, students were instructed by the teacher to share information and no supporting scripted worksheet was made available. Upon completion of both discussions, students participated in an individual topic-based test. The test contained five multiple choice questions and one open-ended question that aimed to evaluate students' understanding pertaining to the topic. Following the test, the final activity was for students to mark their responses on a reflection sheet pertaining to their perceptions and experience of working in a collaborative setting. Students were given ten to fifteen minutes to complete the topic-based test and the reflection questionnaire. Three such tests and reflection responses were collected, one after completing each of the three topics. In addition to that, a sub-set of groups was observed over the course of the sessions in order to assess the quality of discussions between group members in both conditions. The following section provides an overview of how the topic-based tests, reflection questionnaires and classroom observations were analysed.

Data Analysis

Topic-Based Tests

The topic-based tests were scored based on students' correct responses to the multiple-choice and open-ended questions. The multiple-choice questions accounted for one point each, culminating to a total of maximum five points. Whereas, the open-ended question accounted for three points. Each test contained five multiple-choice questions and one open-ended question;

thus, students could obtain a maximum of eight points per test. An answer key was developed to assess students' responses on the test. In order to test the inter-rater reliability of the topic-based tests, a second coder scored all the topic-based tests of the experimental and control group and the Cohen's Kappa was analysed. Cohen's Kappa values were obtained separately for each test under each condition. The average values then obtained for each test. There was satisfactory agreement between the two coders for the first topic-based test, $k = .807$, $p < .05$; for the second topic-based test, $k = .820$, $p < .05$; and for the third topic-based test, $k = .903$, $p < .05$. After assessing the topic-based tests, an independent samples t-test was conducted in order to compare the mean scores of students in both conditions. Moreover, mean scores of low, average and high ability students were also compared between the two conditions. However, due to the small size of this sub-set of the sample (number of students at each ability level), no statistical analysis was made.

Reflection Questionnaire

Students' responses on the reflection questionnaire ranged between five options – Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree. The scores were calculated in the range of 1-5 respectively. The total scores ranged between 24 – 120. A higher score on the reflection questionnaire indicated a more positive experience of collaboration, whereas a lower score indicated that students did not perceive their collaborative experiences very positively. A reliability analysis was conducted, prior to the use of this questionnaire for the study, on 39 eighth-grade students (N = 39, M(age) = 12.85, SD = 0, 23 females and 16 males). The analysis revealed a Cronbach's Alpha score of .814 and Guttman's Lambda value of .839. After the three sessions conducted for this study, mean scores between the control and experimental conditions were compared by means of an independent samples t-test. Furthermore, since the same

reflection questionnaire was used at three different stages, a repeated measures ANOVA was conducted in order to assess the differences in students' experiences of collaborative activities over time.

Classroom Observations

Interactions between two groups from each condition were observed. These groups were chosen randomly and their interactions were further coded on the basis of four out of the five conditions of successful collaboration by Johnson and Johnson (2002): Positive Interdependence, Individual Accountability, Face-to-Face Promotive Interaction and Social Skills. The fifth condition of Group processing is excluded since it refers to actions that take place after the group discussions. In the scope of the current study, these actions were not observed. Johnson and Johnson (2002) elaborated on the five aforementioned conditions. These conditions were then translated as codes and sub-codes to specify and classify actions and interactions between group members.

A coding scheme was developed to analyse students' interactions. The interactions were coded on the basis of students' providing mutual support, explaining their understanding of the topic, making personal contributions, etc. Interactions were analysed at the group level. Table 1 highlights the coding scheme:

Table 1

Coding Scheme for Student Interactions

Main Codes	Sub Codes	Description
Positive Interdependence	Providing Mutual Support Sharing Resources	Interactions showing students' willingness to provide support and resources to their group members.
Individual Accountability	Checking who requires more assistance Explaining own understanding of the topic Making personal contributions	Interactions suggesting students' contributions on a personal level.
Face-to-Face Promotive Interaction	Connecting present with past learning Discussing (nature of) concepts Explaining how to solve problems Teaching one's knowledge to others	Interactions based on domain knowledge related concepts and discussions related to assigned tasks.
Social Skills	Following sequence of interactions Provoking information from group members Questioning group members	Interactions that highlight students' manner of communicating, asking questions, seeking information and holding a discussion.

For each code, the frequency of occurrence was counted and the differences in both conditions were compared. For example, interactions such as, "*Let me help you when everyone is done*" or "*I can explain this if you would like*" showcase students' willingness to provide support to their group members and were hence assigned the Positive Interdependence code. With regard to the Individual Accountability code, observed interactions include the ones that highlight students' willingness to contribute on an individual level and check whether their peers require extra assistance. These included interactions such as, "*I have a pretty good understanding of this"* or "*Is this clear for everyone?*". Furthermore, students' interactions showcasing their domain related discussions and engaging in teaching their knowledge to others in the group were assigned the Face-to-Face Promotive Interactions code. Some examples of these interactions included, "*What is the reason (for the author) to use 'dancing'?*" or "*... Uses these figures of speech*". Finally, the fourth code, Social Skills, included interactions of students that demonstrate students' way of communication, holding discussions and effectively asking questions. These interactions included "*Could you tell me if....*" or "*Could you give an example of a sentence?*". In addition to the observed interactions, the frequency of students participating in help-seeking behaviour, using example questions provided in the scripted worksheet, speaking out of turn or interrupting group members was also noted. Considering the small volume of data, no statistical analyses were made; however, the interactions were analysed only qualitatively.

Results

Differences in Learning Outcomes

In order to investigate the research question "*Does the combined use of collaborative scripts and structured heterogeneous groups positively influence the learning outcomes of (low-achieving) students in an Indian secondary school?"* – an independent samples t-test was conducted to compare mean scores on the topic-based tests between students in the experimental and control condition. Additionally, mean scores of students at each ability level were observed in both conditions. Due to the limited amount of data, the differences in mean scores of students at each ability level were not statistically tested.

Differences between Conditions in Learning Outcomes

Students' learning outcomes were measured by conducting an independent samples t-test to compare their mean scores on the three topic-based tests. Students could obtain a maximum of eight points on each test. Results from the independent samples t-test indicated that the differences in mean scores on all three topic-based tests were not statistically significant. Scores after the first test for the experimental condition (M = 6.760, SD = 1.200) were not significantly different from the control condition (M = 7.148, SD = .704), t = -1.435, p = *.157;* pertaining to the second topic-based test as well, scores for the experimental condition (M = 5.800, SD = 1.527) were not significantly different from the control condition (M = 6.037, SD = 1.125), t = -.633, p = 5.30; finally, no statistically significant differences were observed after the third topic-based test between the experimental condition (M = 7.400, SD = .763) and the control condition control condition (M = 7.259, SD = .902), t = .608, p = .546. Table 2 provides an overview of the results from the independent samples t-tests.

Table 2

Independent Samples T-test Comparing Topic-Based Test Scores

Topic-Based Tests	Groups	*N*	*M*	*SD*	*t*	*p*
Test 1	EG	25	6.760	1.200	-1.435	.157
	CG	27	7.148	.704		
Test 2	EG	25	5.800	1.527	-.633	.530
	CG	27	6.037	1.125		
Test 3	EG	25	7.400	.763	.608	.546
	CG	27	7.259	.902		

Note. EG = Experimental Group, CG = Control Group; P = .05, CI = 95%, equal variances not assumed in case of Test 2 and Test 3 results.

Differences between Ability Levels in Learning Outcomes

To further explore the combined effect of collaborative scripts and structured heterogeneous groups on students of different ability levels in each condition; differences in the mean topic-based test scores were explored. However, due to the limited amount of data, only the mean scores were calculated but could not be statistically tested to determine whether the differences between them were significant. It was noted that on all the topic-based tests, average and high ability students in the control group showed similar or higher mean scores as compared to students in the experimental group. Low ability students in the control group showed a higher mean score as compared to the low ability students in the experimental group on the first topic-based test. However, on the second and third test, low ability students in the experimental group showed higher mean scores compared to the low ability students in the control group. Table 3

showcases the average scores for each ability level between the experimental and control condition.

Table 3

Mean Topic-Based Test Scores of Low, Average and Ability Students

	Test 1				Test 2				Test 3			
	EG		CG		EG		CG		EG		CG	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low Ability	6.500	1.069	7.150	.883	6.375	1.187	5.600	1.429	7.500	.534	6.800	1.032
Average Ability	6.857	1.676	7.416	.491	4.714	1.976	6.166	.752	7.285	.755	7.500	.836
High Ability	6.900	.994	7.000	.632	6.100	1.100	6.363	.924	7.444	1.013	7.545	.687

Note. EG = Experimental Group, CG = Control Group.
Low Ability Students - N (EG) = 8, N (CG) = 10; Average Ability Students - N (EG) = 7, N (CG) = 6; High Ability Students - N (EG) = 10, N (CG) = 11.

Students' Experiences of Collaboration

To explore the research question, *"Do students who participate in scripted and structured collaboration perceive their collaborative learning experiences more positively than the students participating in unscripted and structured collaboration?"* – scores obtained by students on the reflection questionnaire were calculated. The differences in mean scores were compared between the experimental and control condition by means of an independent samples t-test. Additionally, the differences in students' scores over time were also tested by means of a repeated measures ANOVA.

Differences between Conditions in Collaboration Experiences

To compare the differences in students' (self-reported) experiences of participating in collaborative learning activities, an independent samples t-test was conducted. A higher score on the reflection questionnaire indicated a more positive experience and vice-versa. Students responded to the questionnaire after each of the three sessions; thus, the scores of students in the experimental and the control group are compared thrice. In the results pertaining to students' experience of collaboration after the first session, it can be noted that students in the control group (M = 103.31, SD = 10.361) viewed their collaboration experiences to be significantly more positive than students in the experimental group (M = 93.600, SD = 10.870), t = -3.135, p = .003. After the second session as well, the collaborative experiences of students in the control group (M = 102.480, SD = 10.091) were noted to be more positive than students in the experimental group (M = 94.680, SD = 10.738), t = -2.647, p = .011. However, the questionnaire results obtained after the third session highlight that there was no significant difference in the perceived collaborative experiences of students in the control group (M = 97.956, SD = 19.545) as compared to students in the experimental group (M = 95.520, SD = 14.215), t = -.490, p = .627. In the following analyses, the number of students in the control group changes due to excluded cases that include incompletely answered questionnaires and patterns detected in students' responses. Table 4 provides an overview of these results.

Table 4

Independent Samples T-test Comparing Reflection Questionnaire Scores

Questionnaire	Groups	*N*	*M*	*SD*	*t*	*p*
Session 1	EG	25	93.600	10.870	-3.135	.003
	CG	22	103.31	10.361		
Session 2	EG	25	94.680	10.738	-2.647	.011
	CG	25	102.480	10.091		
Session 3	EG	25	95.520	14.215	-.490	.627
	CG	23	97.956	19.545		

Note. EG = Experimental Group, CG = Control Group; P = .05, CI = 95%, equal variances not assumed.

Differences Over Time within Conditions in Collaboration Experiences

In order to investigate differences in the mean scores of students' experiences of collaboration over the course of three sessions, a repeated measures ANOVA was conducted. As noted, in the experimental condition, the mean scores show a gradual increase; however, the results of the repeated measures ANOVA (Sphericity assumed; Mauchly's Test of Sphericity, $df = 2$, $P = .116$) determined that the increase in the mean scores is not statistically significant ($df = 2$, $F = .733$, $P = .486$). Pertaining to the control condition, the results of the repeated measures ANOVA (Mauchly's Test of Sphericity, $df = 2$, $P = .000$; Sphericity not assumed, thus, using the Greenhouse-Geisser correction) showed that the decrease in the mean scores is not statistically significant ($df = 1.195$, $F = .703$, $P = .436$).

Students' Interactions within Groups

To delve into exploring *"What kind of interactions can be observed in Jigsaw collaborative groups – in the scripted and structured vs unscripted and structured conditions?"* a qualitative analysis was conducted. The conditions of Positive Interdependence, Individual Accountability, Face-to-Face Promotive Interaction and Social Skills by Johnson and Johnson (2002) were translated as codes and sub-codes. Consequently, the observed actions and interactions of students were assigned these codes. In both conditions, it was observed that students made efforts to engage in discussions related to the domain knowledge. It was also observed that students in the experimental condition engaged in questions that were similar in nature to the ones provided in the scripted worksheet. For example, the scripted worksheet suggested questions such as "*What is meant by….?*" Or "*What is the reason for…?*"; in a similar manner, students in the experimental group provoked information from their group members by asking questions such as "*What is the relation of locations to the writing?*" , "*Is it because of education or upbringing?*", "*What do you mean by jocund company?*", "*Could you tell me if a sentence can have personification and simile?*", etc. Table 5 below provide some examples and frequencies of interactions noted in the experimental and the control condition.

Table 5

Interactions between Students – Experimental and Control Condition

	Experimental Condition		Control Condition	
Main Codes	Examples of Interactions	Frequency of Occurrence	Examples of Interactions	Frequency of Occurrence
Positive Interdependence	"Let me help when everyone is done." "Would you like me to show you?" "Calm down, we have time." "I can explain that part"	7	"Explain… However you can." "I think you will understand from my notes, look." "I'm going to show an example from the other group (discussion)."	6
Individual Accountability	"Is this clear for everyone?" "The reason that is…." "I can explain that part"	16	"Does anyone have questions?" "If you don't understand, I can explain it." "I have a pretty good understanding of this."	9
Face-to-Face Promotive Interaction	"Focus on writing style"	22	"Let's make a sentence for our parts."	12

	Experimental Condition		Control Condition	
Main Codes	Examples of Interactions	Frequency of Occurrence	Examples of Interactions	Frequency of Occurrence
	"What is the reason to use 'dancing'?" "Let me give an example" "I remember we studied this in the other group."		"…. Uses two figures of speech" "Let's do the important parts and then ask questions." "Pass the segments and try for every segment."	
Social Skills	"Are you sure you understand?" "Can you tell me if…." "Did you discuss…." "Could you give some example?"	22	"Could you explain?" "Could you give an example of a sentence?" "How to ask ….?"	13

As mentioned previously, two groups from each condition were observed. To understand the quality of interactions, the amount of times students engaged in helping behaviour, used example questions from the scripted worksheets, spoke out of turn and interrupted their group members, was also noted. It was observed that students in the experimental condition engaged in helping behaviour more often than their control group counterparts. Overall, fewer instances of students speaking out of turn or interrupting were recorded. It was also noted that students in the

control group used the example questions suggested in the scripted worksheet. Over the course of the sessions, however, some students stopped referring to the worksheet in order to question their group members. Students in the control group also questioned and provoked information from their peers; however, since they did not receive the scripted worksheets, the condition of using example questions did not apply. The following table shows the frequency of these actions in each group, over the course of the three sessions.

Table 6

Frequency of Students' Actions and Interactions During Collaboration

		Frequency of Occurrence							
		Helping Behaviour			Use of Example Questions			Speaking Out of Turn	Interruptions
Group 2 - EG		High	Average	Low	High	Average	Low		
	Session 1	5	2	0	5	5	2	1	0
	Session 2	4	2	2	4	0	3	0	2
	Session 3	2	0	1	2	0	0	0	0
Group 1 - EG		High	Average	Low	High	Average	Low		
	Session 1	4	0	1	0	2	4	0	1
	Session 2	5	2	1	0	3	2	1	2
	Session 3	4	2	0	2	3	3	0	0
Group 5 - CG		High	Average	Low	High	Average	Low		
	Session 1	2	1	0		NA		0	3
	Session 2	3	2	0				1	3
	Session 3	4	0	2				0	5
Group 4 - CG		High	Average	Low	High	Average	Low		
	Session 1	4	1	2		NA		0	2
	Session 2	2	0	0				1	4
	Session 3	2	3	2				3	4

Note. EG = Experimental Group, CG = Control Group

Discussion

The present study aimed to investigate whether scripted and structured collaborative learning can have a positive impact on the learning outcomes and collaboration experiences of students in an Indian secondary school. Additionally, the study was focused on exploring the nature of interactions within the collaborative groups and whether the added support of scripted worksheets can guide students to hold more effective group discussions.

Zooming in on the first research question – "*Does the combined use of collaborative scripts and structured heterogeneous groups positively influence the learning outcomes of (low-achieving) students in an Indian secondary school?"*, it was noted that students in the experimental and control condition had similar learning outcomes. However, a calculation of mean test scores of the low ability students in both conditions revealed that the low ability students in the experimental condition had higher mean scores (in the second and third topic-based tests) as compared to the low ability students in the control group. As stated in the results, this finding is not statistically tested due to the limited amount of data; however, these patterns were explored to get an insight into the performance of students of different ability levels. The patterns in the data of this study are in line with previous research conducted by Saleh, Lazonder and de Jong (2005) which stated that low-ability students benefit from the social interactions involved in collaboration, they receive the required guidance or support from peers who are more capable and therefore, benefit from being in groups with high-ability students. Additionally, this result also corresponds with a study by van Dijk, Eysink and de Jong (2019) stating that low ability students who worked in heterogeneous groups and followed a worksheet to structure interactions showed significant learning gains. However, to prove this effect in the Indian context, this study could be repeated in the future including more participants.

While examining the differences in learning outcomes between the experimental and control condition, no statistically significant differences were found; indicating that students in both conditions had similar learning outcomes. A probable explanation for the insignificant differences between the two conditions could be the introduction of a new method of learning in this Indian classroom. Students in the participating school had little prior experience of working in groups; however, by participating in this study, students worked in a jigsaw collaborative setting for the first time. They also made use of scripted worksheets for the first time.

On a daily basis, English language classes in the participating Indian secondary school follow a traditional direct instruction approach wherein students do not play a very active role. On the contrary, working in a collaborative setting, such as the one proposed in this study, required the students to work largely in an autonomous manner wherein they are expected to read and understand for themselves and to explain their understanding of the topic to their peers. The teacher merely plays the role of a moderator or facilitator. This contrasts strongly with the previously mentioned, comparatively passive role of students in the classroom (Mehrotra et al., 2009; Srikala & Kishore, 2010). In this study, students engaged in assignments and discussions which are open-ended in nature; research by Blatchford, Kutnick, Baines and Galton (2003) suggests that in such a situation, it is important to ensure that students have the necessary skills to work autonomously from the teacher, or that they are given the support in order to achieve those skills. Since it is a common practice for the school to follow a traditional, lecture approach in the classroom; it could be suspected that students lack the skills to work autonomously from the teacher, and despite the support provided by means of a scripted worksheet, acquisition of these skills may take longer. Research by Weinberger (2003) provides support to this claim, as it states that for collaborative knowledge acquisition to be effective and for the implementation of

scripts to be successful, students require time and practice. In order to understand whether the use of scripted worksheets in heterogeneous groups leads to significantly higher learning outcomes, it would be necessary to conduct an intervention spanning over a longer duration.

Pertaining to the second research question – "*Do students who participate in scripted and structured collaboration perceive their collaborative learning experiences more positively than the students participating in unscripted and structured collaboration?"* it was observed that the mean scores of students in the control condition were significantly higher after the first two sessions; however, after the third session there were no statistically significant differences between the two conditions. It can be predicted that since students were expected to collaborate as per the guidelines of the scripted worksheet; this setting does not allow for students to learn according to their preferred method or environment; and therefore, could be a reason behind the lower mean scores of students in the experimental condition after the first and second session. For instance, students may be inclined to work individually instead of discussing information with their peers during a group discussion; however, they engage in questioning or explaining simply because the script instructs them to do so. Additionally, the novelty effect may be considered an influential factor for higher mean scores in the control condition. Previous studies have suggested that novel conditions can attract or increase students' attention for a while; however, their interests or engagement behaviour may drop once the novelty effect wears off (Bergin, 1999; Tsay & Kofinas, 2017). Similarly, in the current study, it can be observed that while students in the control group view their collaboration experiences more positively after the first and second session, these differences do not exist after the third session and students in both conditions report similar mean scores. The decrease in differences between the two conditions

could be due to the novelty effect gradually wearing off. However, to investigate this possibility, the intervention would have to be tested for a longer duration.

Finally, with regard to the third research question – *Are scripts beneficial in promoting effective interactions - such as information seeking and sharing - within the groups?;* qualitative analysis was conducted. Since the qualitative analysis is conducted on a small sample size of the sub-set of participants; no statistical claims could be made. Even though it was revealed that students in both conditions engaged in meaningful interactions, students in the experimental condition engage account for more frequent interactions that indicate positive interdependence, individual accountability, promotive interaction and social skills. It was observed that students in the experimental condition faced fewer issues of conflicts within the groups regarding turn taking and information sharing. They also engaged in helping behaviour more frequently. This finding demonstrates that scripts can be effective in structuring and focusing students' attention towards the assigned tasks. However, this effect must be investigated further with more qualitative data.

Limitations and Implications for Future Research

Based on students' largely positive responses regarding their experiences of collaboration, it can be stated that the intervention was well-received by the students. However, analyses revealed that students in the control and experimental condition did not show significant differences in their knowledge gains or their perception of collaborative activities. The following limitations of this study must be addressed.

Scheduling constraints could have a role to play in the results achieved. The current design of the intervention included six consecutive days of sessions wherein students were expected to read, participate and be active in the classroom. Although the initial plan was to

include six one-hour sessions spread over six weeks, scheduling constraints made it difficult to do so. It could be presumed that a less intensive schedule would make it easier for students to get used to such active classroom learning and could lead to better perceptions of their collaborative experiences. The reduced the duration of the intervention also resulted in obtaining comparatively less data. As mentioned previously, the floods in Pune also posed a challenge in the scheduling of sessions. Some sessions had to be postponed and some participants had to drop out of the study.

A plausible explanation for the insignificant differences could be the novelty effects of the implementation of this new method of learning. It must also be taken into account that in order to improve the collaborative knowledge sharing processes and the use of scripts, students may need time to practice and get accustomed to the processes involved (Weinberger, 2003). Thus, an intervention conducted over a longer duration would allow the researcher to gather more data on students' performance and would allow students to get better accustomed to the collaborative learning environment.

The use of observation notes to analyse the nature and quality of students' interactions was limitative in nature due to the fact that only a sub-set of participants was observed. Recording interactions of students using an electric device could have made it possible to evaluate the interactions between more groups, thus leading to more data that gives insight into the quality and nature of interactions. Considering the limited amount of qualitative data, no statistical claims could be made. Therefore, audio or video recordings of students' interactions could be used in future research for improved qualitative analysis.

In the study by Weinberger (2003), it is pointed out that the extent to which collaborative knowledge construction is accepted as a method of learning by an institution is an important

factor. In case of this study, the implementation of collaborative learning methods revealed that a structured and scripted collaborative learning environment was well-received by teachers and students alike. However, it also revealed that students in the Indian education context are unfamiliar with such a learning environment because these methods are not inculcated into the school's system. Research by Weinberger (2003) also stated that collaborative knowledge construction should be inculcated in the school; and supported by the educators and students alike. Therefore, it is necessary to direct future research on implementing collaborative learning interventions and building students' and educators' familiarity with this learning method while providing them with the necessary support. While students in this context do show promise in the necessary social skills and domain related prior knowledge, they lack the experience of working autonomously in such collaborative settings. It is necessary for these students to systematically experience and develop required skills for collaborative knowledge construction over time (Weinberger, 2003).

Overall, this study showed strong potential for using collaborative learning methods in Indian classrooms. It revealed that students are able to hold effective, content related discussions, they are able to recall and elaborate on the ideas discussed during the sessions and most importantly, they are able to work autonomously while the teacher merely plays the role of a facilitator. Therefore, moving forward from the findings of this study, future research is needed on delivering and investigating the long-term effects of collaborative learning on students' knowledge acquisition and development of social skills in the Indian context.

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Appendices

Appendix 1: Consent Form

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Informed Consent

Dear Parents,

As a part of a research being conducted on collaborative learning, we are requesting students to answer a questionnaire pertaining to their experiences and behaviours while working in groups with their peers. Following is some information about the research and the questionnaire.

The purpose of this questionnaire:
The aim of the research is to create collaborative learning environments that are all-encompassing and promote greater learning outcomes in secondary school students. The responses gathered from this questionnaire will be analysed for the purpose of this research. As mentioned, the statements in the questionnaire will be about the experiences that students have had or behaviours that they have engaged in during any group activities with their peers.

Your child's role and data as a participant:
It is important to know that your child's data such as their name, age, sex and grade is meant for demographic purposes. It will be kept completely anonymous and confidential and is intended for research purposes only. Their participation is completely voluntary. Refusal or withdrawal will involve no penalty, now or in the future. Their data will be stored securely according to the ethical standards of the University of Twente, The Netherlands. You may also request to have it deleted. The questionnaire should take approximately 10 minutes to complete. The study involves no risk or harm to the students.

Parent/Guardian statement:

I consent voluntarily for my child to be a participant in this study and understand that the data will be kept anonymous and confidential.	**Yes** ☐	**No** ☐

Name of the participant (student): _____

Name of the parent/guardian: _____

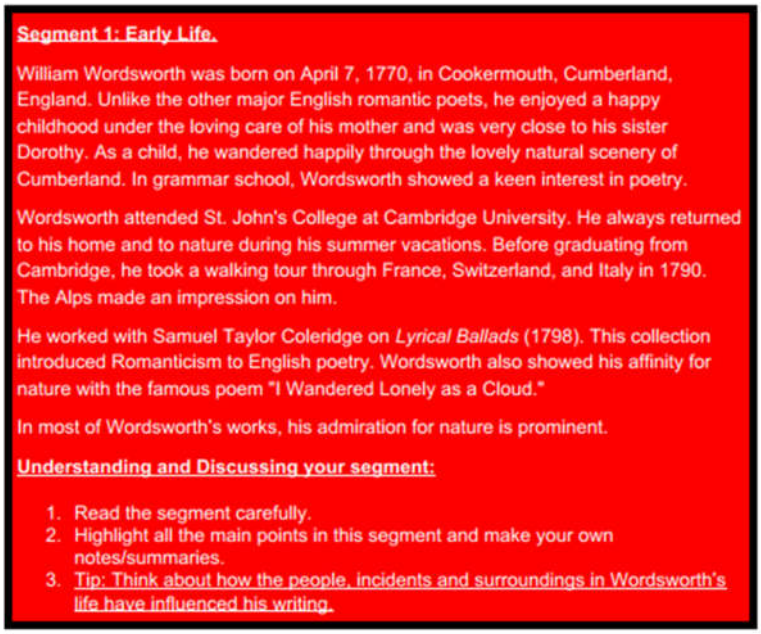
Relation to the participant: _____

Signature of the parent/guardian: _____

Additional Details:
Should you need any further information related to the research, you may contact the researcher Ms. Apoorva Sonawane via email at a.y.sonawane@student.utwente.nl. Thank you for your participation.

Appendix 2: Information Segments

Following are the information segments from Session 2



Segment 1: Early Life.

William Wordsworth was born on April 7, 1770, in Cookermouth, Cumberland, England. Unlike the other major English romantic poets, he enjoyed a happy childhood under the loving care of his mother and was very close to his sister Dorothy. As a child, he wandered happily through the lovely natural scenery of Cumberland. In grammar school, Wordsworth showed a keen interest in poetry.

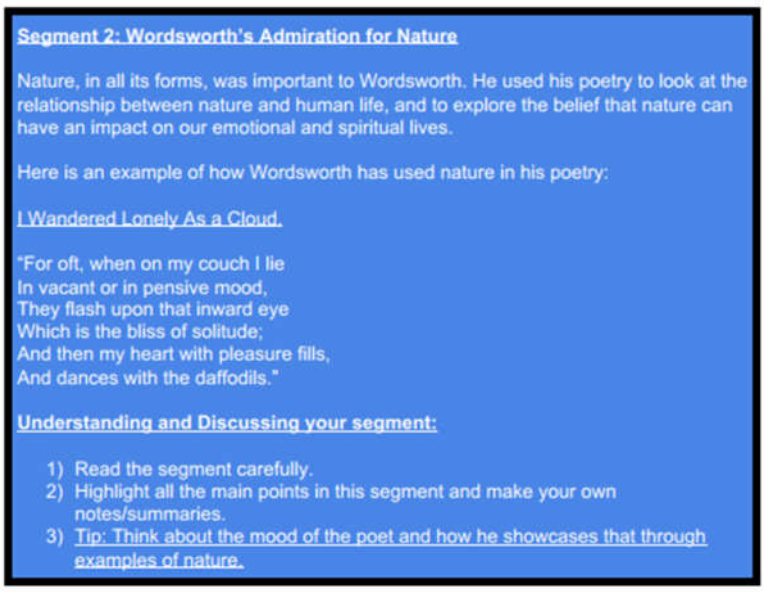
Wordsworth attended St. John's College at Cambridge University. He always returned to his home and to nature during his summer vacations. Before graduating from Cambridge, he took a walking tour through France, Switzerland, and Italy in 1790. The Alps made an impression on him.

He worked with Samuel Taylor Coleridge on *Lyrical Ballads* (1798). This collection introduced Romanticism to English poetry. Wordsworth also showed his affinity for nature with the famous poem "I Wandered Lonely as a Cloud."

In most of Wordsworth's works, his admiration for nature is prominent.

Understanding and Discussing your segment:

1. Read the segment carefully.
2. Highlight all the main points in this segment and make your own notes/summaries.
3. Tip: Think about how the people, incidents and surroundings in Wordsworth's life have influenced his writing.



Segment 2: Wordsworth's Admiration for Nature

Nature, in all its forms, was important to Wordsworth. He used his poetry to look at the relationship between nature and human life, and to explore the belief that nature can have an impact on our emotional and spiritual lives.

Here is an example of how Wordsworth has used nature in his poetry:

I Wandered Lonely As a Cloud.

"For oft, when on my couch I lie
In vacant or in pensive mood,
They flash upon that inward eye
Which is the bliss of solitude;
And then my heart with pleasure fills,
And dances with the daffodils."

Understanding and Discussing your segment:

1) Read the segment carefully.
2) Highlight all the main points in this segment and make your own notes/summaries.
3) Tip: Think about the mood of the poet and how he showcases that through examples of nature.

Segment 3: Famous Works

1) One of the most famous poems in the English language, I wandered lonely as a Cloud, was composed two years after Wordsworth saw the daffodils while walking along the shore of Ullswater on a stormy day with his sister, Dorothy.
Excerpt:
"And then my heart with pleasure fills,
And dances with the daffodils."

2) It is a Beauteous Evening, Calm and Free describes an evening walk on the beach which Wordsworth took with his nine years old daughter Caroline in France in August 1802. The sight was majestically beautiful.
Excerpt:
"It is a beauteous evening, calm and free,
The holy time is quiet as a Nun
Breathless with adoration; the broad sun
Is sinking down in its tranquillity;"

Understanding and Discussing your segment:

1. Read the segment carefully.
2. Highlight all the main points in this segment and make your own notes/summaries.
3. Tip: Try to look at some similarities in the two poems.

Segment 4: Romanticism

Romanticism is a literary movement. William Wordsworth was one of the first British poets to explore the new theories and ideas. Romanticism can be explained as the free expression of the feelings of the poet.

Excerpt from
"Her eyes as stars of twilight fair;
Like twilight's, too, her dusky hair"

Understanding and Discussing your segment:

1) Read the segment carefully.
2) Highlight all the main points in this segment and make your own notes/summaries.
3) Tip: Try to look at the way emotions are expressed in the excerpt. How does it showcase free expression?

Segment 5: Lyrical Ballads

A lyrical ballad is traditional verse poetry that uses consistent rhythm and meter, rhyme, and the language of common speech to convey and arouse emotions while treating the topics of everyday life. It is poetry for the common person designed to impart pleasure while retaining a standard of literary quality. Examples of lyrical ballads from Wordsworth are "I Wandered Lonely as a Cloud," We Are Seven," and "The Tables Turned."

Ballads are poems or songs narrating a story in short stanzas. Traditional ballads are typically of unknown authorship, having been passed on orally from one generation to the next.

Understanding and Discussing your segment:

1) Read the segment carefully.
2) Highlight all the main points in this segment and make your own notes/summaries.
3) Tip: Think about why ballads became popular. Is it because people found them to be easier to follow/comprehend?

Appendix 3: Scripted Worksheet

1

Guidelines for the session:

Given below are the guidelines for today's session.

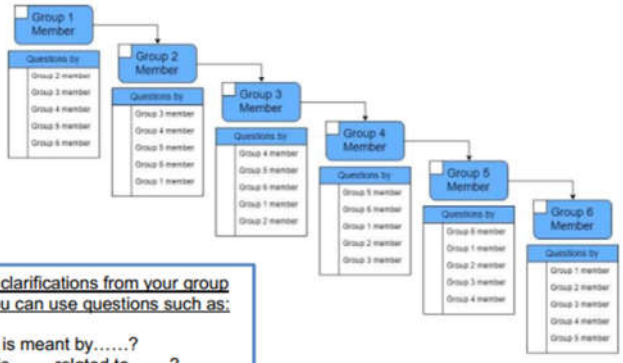
Along with this, you will receive the task-list for today (page no. 3). This task list will mention the topics we will learn today and the segment for which each member is responsible. Every group member will get their segment separately on different coloured cards.

Step 1:

- Every group member must read their segment thoroughly.
- You are encouraged to make some notes/summaries. This will help you remember key points and teach your group members later.
- Read it a couple of times to be familiar with the segment; you don't need to memorize it.

Step 2:

- All the members with the same segment, gather together for a discussion on their topic. (All members with the green card come together, same goes for all the reds, blues, yellows and purples.)
- Each member explains what they have understood after reading their part. After every member shares information, the others have a chance to question them on their segment. (The order of information sharing is based on the number of the group - the member of group 1 speaks first and the following members have the chance to ask questions, and so on.) Check the box when a member finishes his/her turn.
- Refer to the scheme and guiding questions below.
- You may make some notes for your understanding and to share with your group.

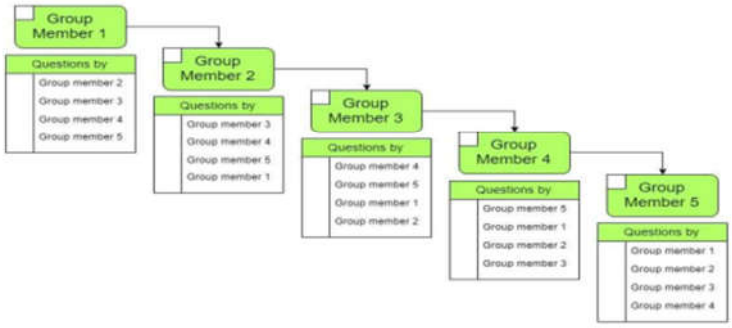


Tip: To seek clarifications from your group members, you can use questions such as:

- What is meant by……?
- How is …… related to ……?
- What could be the reason for ….?
- Do you think ….. is similar/different to ….?
- Could you give an example of….?

Step 3:

- It's time to share your knowledge with your own group. Go back to your group.
- Follow the discussion flow as given below. (The order of information sharing is based on the number on your segment). Check the box when a group member finishes his/her turn.



- Ask questions and discuss a topic until it is clear to all group members. In the quiz (step 4), you will be asked questions about each part and not just your segment. Be sure to learn from your group members.
- You are encouraged to make some notes when your group members are explaining their segment.
- Please note: Refer to the example questions given above, feel free to modify as needed.

At this point, every group member should have completed their turn.

Step 4:

- You will now receive a short quiz.
- This quiz is based ONLY on the topics we have discussed today. It is based on the five different segments we have studied.
- You will see 5 multiple choice questions and 1 open-ended question.
- For this quiz, you will be scored individually; therefore, no group discussion is allowed.
- However, since we are learning in groups, the group will also receive a grade - which will be calculated by obtaining the average score of all the group members.
- All the best!

Step 5: The final step of the session is the reflection. You will receive a questionnaire (with all the necessary instructions) and you are expected to mark the answers as per your experience in today's session. No right or wrong answers in this one.

Appendix 4: Topic Based Test

Following is the topic-based test from Session 2

Quiz 1: Author Study - William Wordsworth.

Choose the correct option:

1) What, would you say, is most prominent in his famous poem, "I wandered lonely as a cloud"?

   a) His admiration for nature
   b) His appreciation for free-willed sprightly dance-forms
   c) Ability to enjoy free time by lying on the couch

2) The poet, William Wordsworth, took a walking tour through France, Switzerland and Italy where the Alps made an impression on him. Which country was he born in?

   a) England
   b) France
   c) Switzerland

3) Which of William Wordsworth's following poems, is famous for his admiration of nature?

   a) It is a beauteous evening, calm and free
   b) The Heart of a Tree
   c) I Know Why the Caged Bird Sings

4) Which ONE option does NOT describe Romanticism in poetry?

   a) Romanticism is a literary movement
   b) Free expression of the feelings of the poet
   c) Consistent rhythm and meter

5) Which ONE option is NOT present in a lyrical ballad

   a) Language of common speech
   b) Consistent rhythm and meter
   c) Difficult/complex vocabulary

P.T.O.

Briefly describe Wordsworth's writing style and what has influenced it.

_____

_____

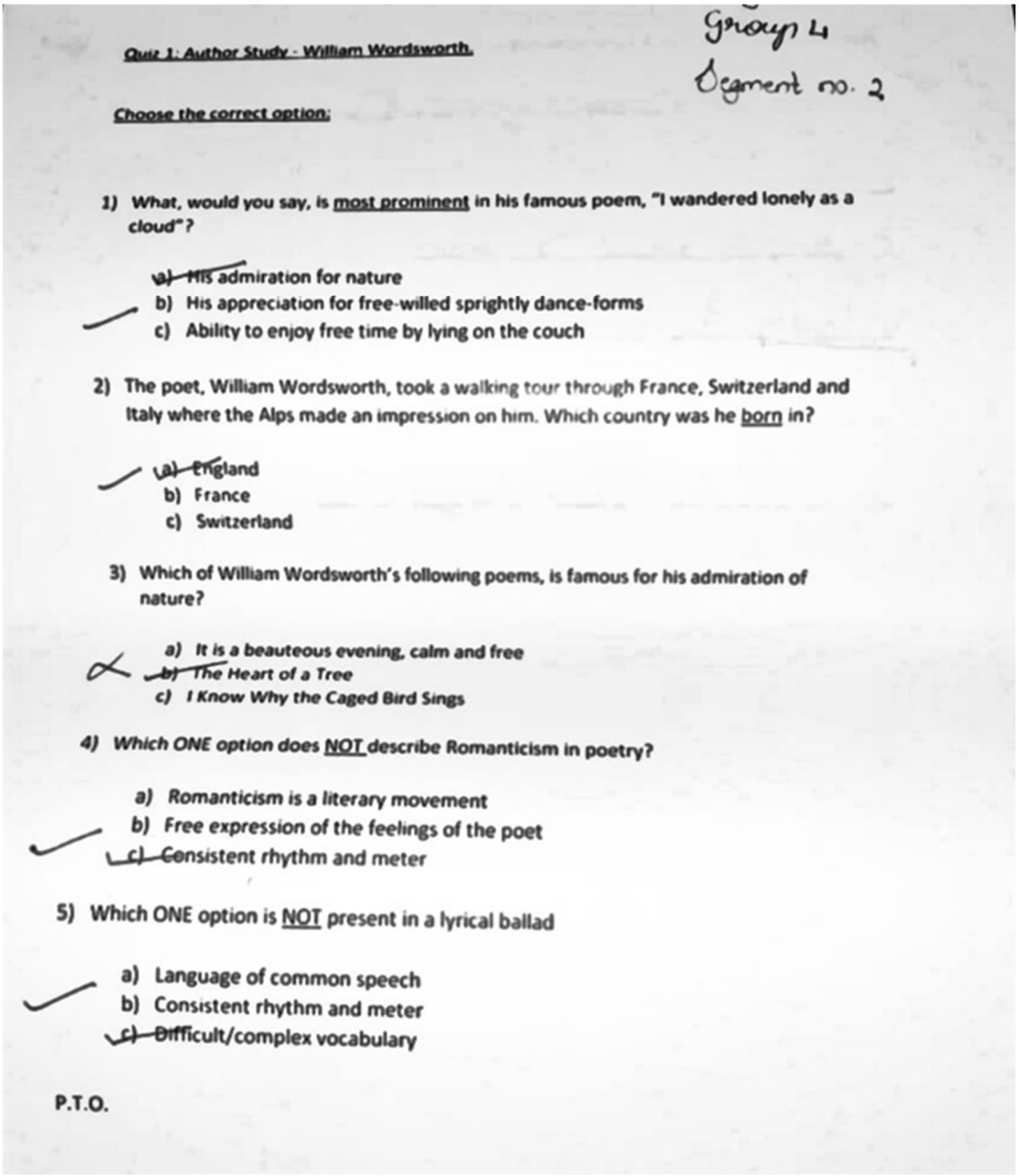
_____

_____

_____

_____

4.1 Topic-Based Test Answers from a Student in the Control Group



Quiz 1: Author Study - William Wordsworth.

Group 4
Segment no. 2

Choose the correct option:

1) What, would you say, is most prominent in his famous poem, "I wandered lonely as a cloud"?

~~a) His admiration for nature~~
b) His appreciation for free-willed sprightly dance-forms
c) Ability to enjoy free time by lying on the couch

2) The poet, William Wordsworth, took a walking tour through France, Switzerland and Italy where the Alps made an impression on him. Which country was he born in?

~~a) England~~
b) France
c) Switzerland

3) Which of William Wordsworth's following poems, is famous for his admiration of nature?

a) It is a beauteous evening, calm and free
~~b) The Heart of a Tree~~
c) I Know Why the Caged Bird Sings

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5) Which ONE option is NOT present in a lyrical ballad

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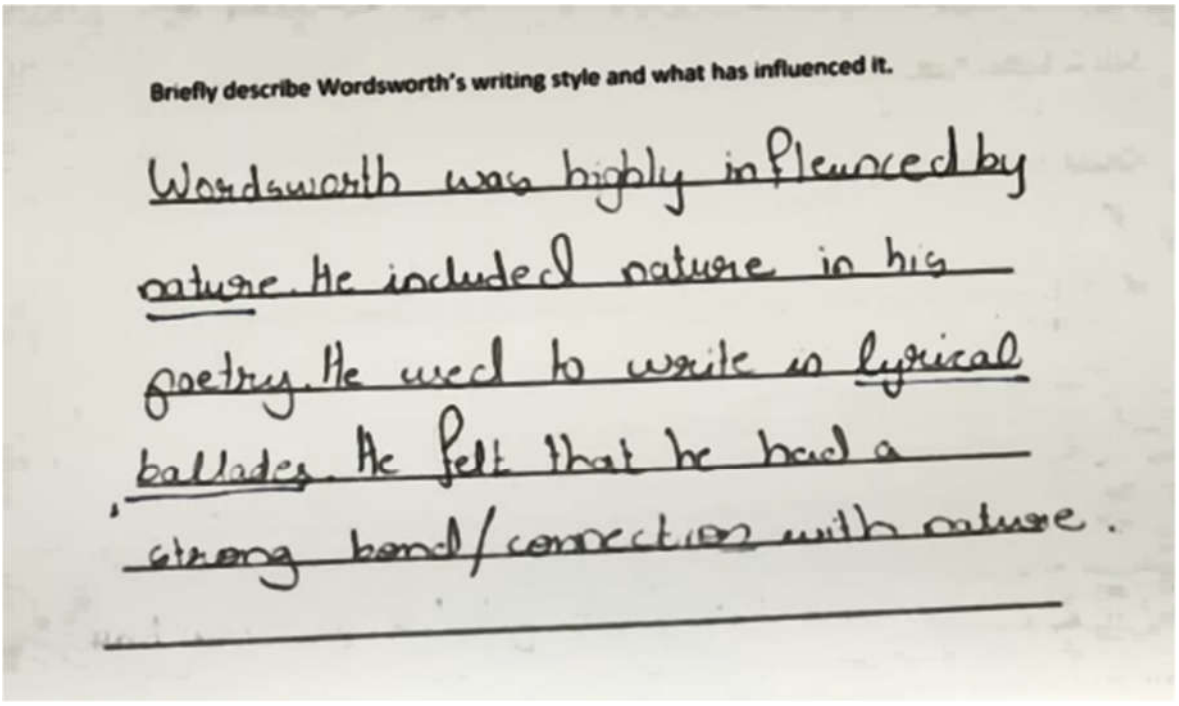
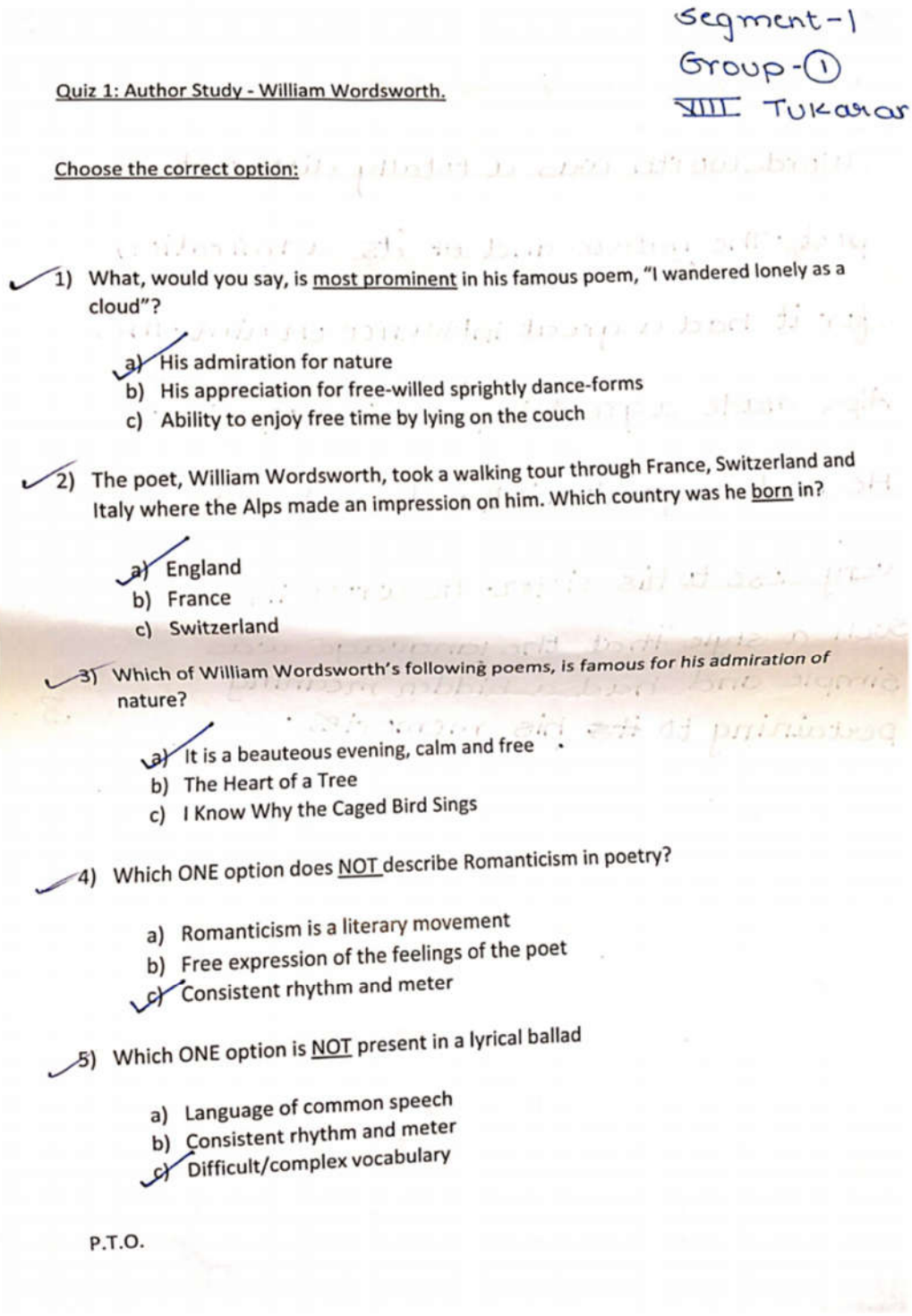
b) Consistent rhythm and meter
~~c) Difficult/complex vocabulary~~

P.T.O.


Briefly describe Wordsworth's writing style and what has influenced it.

Wordsworth was highly influenced by nature. He included nature in his poetry. He used to write in lyrical ballades. He felt that he had a strong bond/connection with nature.

4.2 Topic-Based Test Answers from a Student in the Experimental Group



Segment-1
Group-①
VIII Tukasar

Quiz 1: Author Study - William Wordsworth.

Choose the correct option:

1) What, would you say, is most prominent in his famous poem, "I wandered lonely as a cloud"?

a) His admiration for nature
b) His appreciation for free-willed sprightly dance-forms
c) Ability to enjoy free time by lying on the couch

2) The poet, William Wordsworth, took a walking tour through France, Switzerland and Italy where the Alps made an impression on him. Which country was he born in?

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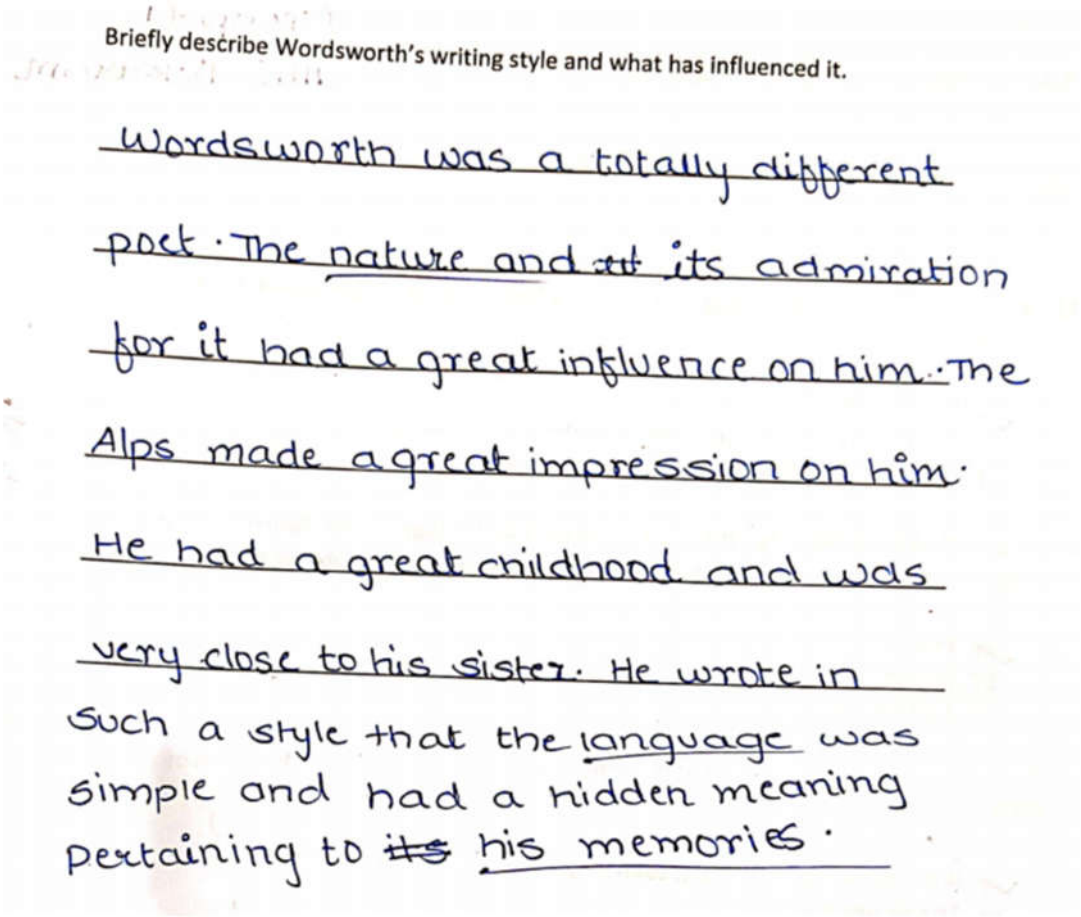
a) Language of common speech
b) Consistent rhythm and meter
c) Difficult/complex vocabulary

P.T.O.



Briefly describe Wordsworth's writing style and what has influenced it.

Wordsworth was a totally different poet. The nature and ~~it~~ its admiration for it had a great influence on him. The Alps made a great impression on him. He had a great childhood and was very close to his sister. He wrote in such a style that the language was simple and had a hidden meaning pertaining to ~~its~~ his memories.

Appendix 5: Reflection Questionnaire

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Dear Students,

Thank you for your participation. The questionnaire below is a part of a research conducted in the field of collaborative learning. The questionnaire should take approximately 10 minutes to complete. It starts with some questions such as age, sex and grade. Additional information will be provided ahead. Before you start filling out the questionnaire, you are asked to read the following information carefully.

Your role and data as a participant:
Before you answer the following questions, it is important to know that all your data will be kept completely anonymous and confidential and is intended for research purposes only. Your participation is completely voluntary. Refusal or withdrawal will involve no penalty, now or in the future.

Participant statement:

I have read the information and understand that my data will be used for research purposes. **Yes** ☐ **No** ☐

Name of the participant: _____

Signature of the participant: _____

Additional Details:
Should you need any further information related to the research, you may contact the researcher Ms. Apoorva Sonawane via email at a.y.sonawane@student.utwente.nl. Thank you for your participation.

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Age: _____ **Sex:** _____ **Grade:** _____

The following questionnaire consists of 24 statements. Read every statement carefully. There are no 'right' or ' wrong' answers, just answer the questions honestly. Select the statement that best applies to you at this moment.

Selecting the options:
1 - Strongly disagree: if you totally disagree with the statement, or if you think the statement is not true.
2 - Disagree: if you disagree with the statements or if you think the statement is largely not true.
3 - Neutral: if you are neutral, cannot decide or if you think the statement is mostly not true.
4 - Agree: if you agree with the statements or think the statement is mostly true.
5 - Strongly agree: If you completely agree with the statements.

Example: If you completely agree with the statement 'I feel comfortable working with my group', you **circle the option**: 'Strongly Agree'.

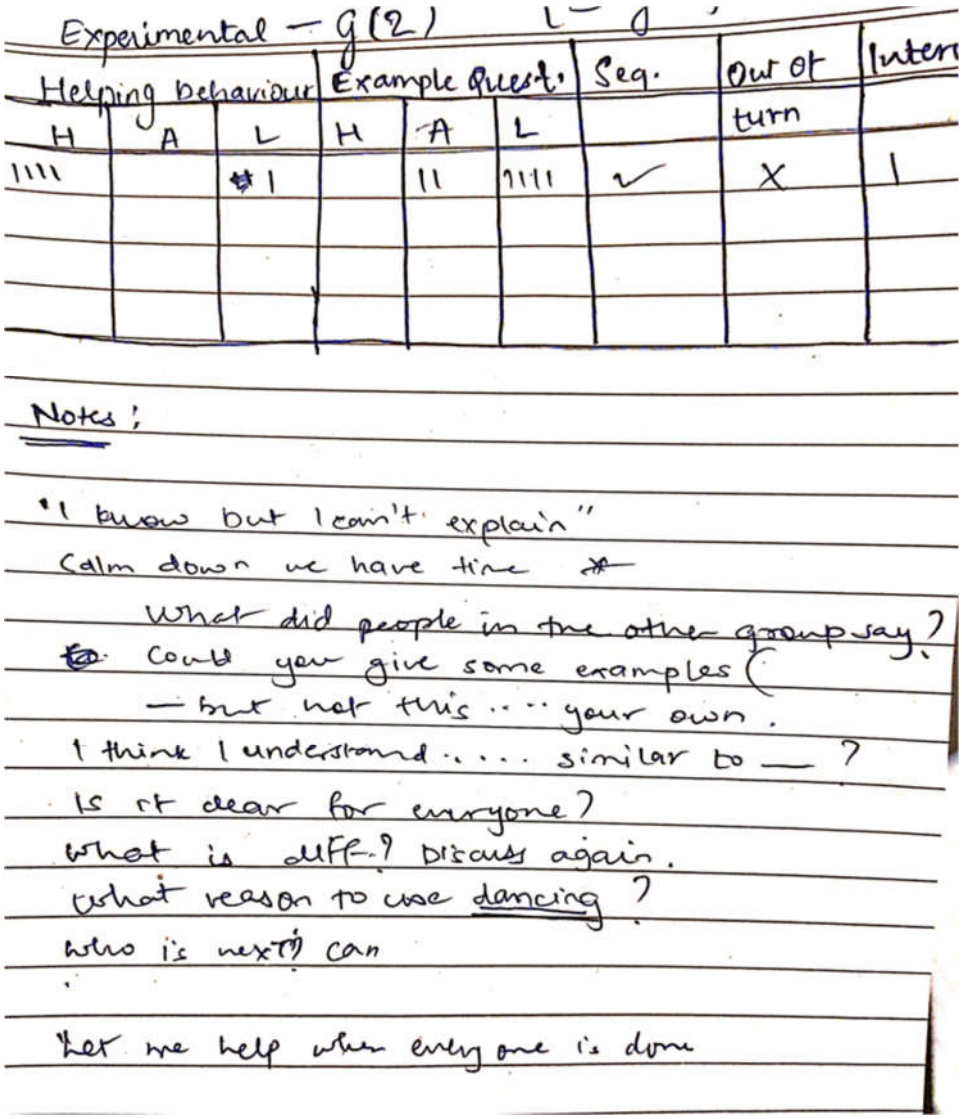
You can **only circle one of the responses**. Be assured that all answers you provide will be kept in the strictest confidentiality. Make sure you respond to every statement.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I was able to learn more about the topic while working with my group.	1	2	3	4	5
My group members helped me when I did not understand something.	1	2	3	4	5
I feel comfortable working with my group.	1	2	3	4	5
I actively contributed to my group's activities.	1	2	3	4	5
The different points of view of my group members helped me understand more about the topic.	1	2	3	4	5
I helped my group members.	1	2	3	4	5
I feel like I can share my opinions with my group freely.	1	2	3	4	5
I felt responsible for the end-product.	1	2	3	4	5
I learnt something from my group members.	1	2	3	4	5

UNIVERSITY OF TWENTE.

I shared my resources or expertise with my group members.	1	2	3	4	5
We solved problems collectively in our group.	1	2	3	4	5
I feel like I made a contribution to the end-product.	1	2	3	4	5
I was able to develop new skills by working in this group.	1	2	3	4	5
My group members provided me with the support I needed.	1	2	3	4	5
As a group, we discussed the concepts being learned.	1	2	3	4	5
I knew that my individual contributions are important to achieve our goals as a group.	1	2	3	4	5
With the help of my group members, I developed a better understanding of the topic.	1	2	3	4	5
My group was supportive.	1	2	3	4	5
I encouraged my group members.	1	2	3	4	5
I did not depend solely on the contributions of my group members.	1	2	3	4	5
I have a good understanding of the topic after participating in the group activity.	1	2	3	4	5
I worked toward achieving our group objective.	1	2	3	4	5
In my group, we supported each other's efforts to learn.	1	2	3	4	5
I felt responsible for my own learning.	1	2	3	4	5

Appendix 6: An example of the Classroom Observations



Experimental – G(2)

Helping behaviour			Example Quest.			Seq.	Out of turn	Inter
H	A	L	H	A	L			
IIII		*1		II	IIII	✓	X	1

Notes:

"I know but I can't explain"
Calm down we have time *
What did people in the other group say?
Could you give some examples (
– but not this ... your own.
I think I understand .... similar to — ?
Is it clear for everyone?
What is diff.? Discuss again.
What reason to use dancing?
Who is next? can

Let me help when everyone is done