Examining the complex dynamics of learning in cooperative small groups: The relationship between student attitudes, group behaviours, and academic achievement

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A Thesis
in
The Department
of
Humanities

Presented in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy (Ph.D.) at
Concordia University
Montreal, Quebec, Canada

May 2005

Your file Votre référence
ISBN: 978-0-494-16308-5
Our file Notre référence
ISBN: 978-0-494-16308-5

ABSTRACT

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Based on the volumes of research demonstrating the cognitive and affective benefits of cooperation, small group strategies are increasingly being implemented in classrooms. However, in order for learning to be enhanced in the small group environment, there has to be clearer understanding of the complex dynamics that operate when students work together. The purpose of this study was to investigate how student attitudes toward small group learning and group behaviours influence learning. A main goal of this study was to validate the Student Attitudes toward Group Environments (SAGE) questionnaire that tapped areas of small group learning not addressed by other inventories. The findings indicated that the SAGE questionnaire is a valuable instrument for it serves both as a diagnostic measure and as a predictive measure. There were two significant predictors that explained 13.3% of the variance in student final grades; the attitudinal factor *quality of product and process* and the behavioural factor *seeking content information*. Overall, high school and CEGEP students had positive attitudes toward learning with fellow classmates. However, students wanted the freedom to select their group members, and group evaluation and division of task elicited diverse views. This information is critical for small group researchers and educators who are interested in knowing the underlying processes that influence academic achievement and success in cooperative groups.

ACKNOWLEDGEMENTS

Dedication and determination, as well as a strong support system, are all essential in completing a doctoral dissertation. Therefore, I would like to extend a heartfelt thank you to the various contributors who were involved in this research.

I am extremely grateful to my advisor Dr. Philip C. Abrami for his guidance, mentoring, and support throughout the years. His encouragement and confidence in me sustained my efforts throughout the process of conducting my doctoral studies. To my co-supervisors, Dr. Nina Howe and Dr. Richard Cawley, I would like to express my appreciation for their support, feedback, and patience. I would like to thank the members from the Centre for the Study of Learning and Performance for their assistance and friendship. I would also like to thank all the high school and CEGEP students and educators, especially Ms. Sandy Glashan, who participated in this study.

Finally, I would like to thank my family for their love and support, as well as for standing by me through everything. I would like to thank my husband Chris Exarhakos and children, Debbie and Billy, for their love, patience, and understanding. Thank you for being a constant reminder of what really is important in life. And finally, I thank my parents, Nick and Ephy Kouros, my sister Helen, and her children, Erica and John-Nicholas for their love and encouragement and also for being part of my support team.

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INTRODUCTION

Overview and Statement of the Problem

Over the past few decades there has been much emphasis on understanding how to maximize student learning and productivity in classrooms and how to positively enhance the academic learning experience. This quest for information has led to increased interest in pedagogical approaches that emphasize active learning through interpersonal interaction. One particular instructional strategy that has caught the attention of researchers, educators, and school board officials is cooperative learning. Cooperative learning is viewed as a valuable instructional strategy that strengthens active learning at school and promotes the cognitive and social development of students (Krol, Veenman, & Voeten, 2002). According to Krol et al. (2002), promoting cooperative learning in classrooms has been part of the educational reform for the past few decades in North America as well as in European countries. Veenman, Denessen, van den Akker, and van der Rijt (2005) state that in light of its established effectiveness, cooperative learning is regarded in countries such as the United Sates, Australia, and Israel as a necessary part of primary school instruction to promote active student participation and learning.

In the province of Québec, the Ministère de l' Èducation has recently implemented a major reform of the curriculum (the Québec Education Program), which enables students to have a more active role in their own learning. According to the reform, the schools mission is threefold: to provide instruction, to socialize, and to provide qualifications (Ministère de l' Èducation du Québec, 2000). Based on this mission, the emphasis is on students' cognitive development, mastery of knowledge, promotion of

values of democracy, and the need to provide all students with an educational environment that corresponds to their interests and aptitudes. Many aspects of the Québec Education Program require a constructivist approach to learning in which learning is viewed as a process and students as the main contributors in the process. The Québec Education Program "recognizes the need to develop intellectual, methodological, personal and social, and communication related competencies in all students" (Ministère de l' Èducation du Québec, 2000, p. 6).

Cooperative learning is increasingly being recognized as a strategy that produces learning gains, develops higher order thinking skills, promotes prosocial behaviour, and interracial acceptance (Cohen, 1994). It also serves as a technique that manages academic heterogeneity in classrooms. Cooperative learning is structured small group learning in which students work together to achieve common goals and individual success is contingent upon the success of each group member. Research reviews on cooperative, competitive, and individualistic goal structures clearly indicate that cooperation typically results in: (a) higher achievement and greater productivity; (b) more caring, supportive, and committed relationships; (c) greater psychological health and self-esteem; and (d) more favorable attitudes toward learning (Springer, Stanne, & Donovan, 1999; Johnson & Johnson, 1999; Johnson, Johnson, & Smith, 1995). Gillies (2002) conducted a 2-year follow up study on the lasting effects of cooperative learning experiences of grade five students. The research findings suggested that students who were trained to work cooperatively in the past were more willing to help other students by providing explanations in response to requests for help and other unsolicited helping responses. Gilles concludes that "the positive benefits of working cooperatively, such as the help

provided, the relationships established, and the learning achieved may contribute to an overall sense of emotional well-being and adjustment that children remember and actively seek to maintain" (p. 20).

Some factors that make cooperative learning desirable in the classroom include: the method's capacity to accommodate individual differences, the focus on social and academic outcomes, its compatibility with social constructivism, and its advocacy by respected researchers in education (Antil, Jenkins, Wayne, & Vadasy, 1998). Johnson, Johnson, and Stanne (2000) claim that there are many reasons why cooperative learning should enter the mainstream of educational practice. First, cooperative learning is based on a variety of theoretical perspectives. Second, many studies have shown the effectiveness of the method for promoting student learning and social relations in relation to whole class methods of instruction. Third, a variety of cooperative learning methods are available for teacher use. Finally, to assess the effectiveness of cooperative learning, researchers have developed a number of cooperative learning procedures, evaluated these methods, as well as involved themselves in teacher-training programs.

School board officials and researchers are increasingly viewing small group learning as an educational innovation that can transform students' learning experiences (Ministère de l' Èducation du Québec, 2000; Blumenfeld, Marx, Soloway, & Krajcik, 1996). Based on the encouraging evidence from educational and psychological research, many elementary, secondary, and college classroom teachers are trying to implement small group learning, where traditionally whole class frontal teaching has been the preferred method of instruction. A national survey conducted in the United States indicated that 79% of elementary school teachers and 62% of middle school teachers

reported that they implemented cooperative learning strategies in their classrooms (Puma, Jones, Rock, & Fernandez, 1993). In comparison to primary and secondary schools, there is less cooperative learning being used at the college level (Springer et al., 1999). Although more and more teachers are aware of cooperative learning strategies and implementing them their classrooms, cooperative learning has still not become a mainstream practice in educational environments.

Many hours, materials, and financial resources have been devoted to training educators to implement cooperative learning strategies in their classrooms. However, on many occasions the positive research findings are not evident in the actual classroom setting. Not every group learning experience is effective and productive. Learning from peers in cooperative groups is complex and difficult to achieve. Low achievers can be stigmatized, status differences can emerge, and dysfunctional interactions among students can occur (Blumenfeld et al., 1996). While there are ways to overcome these issues, there is no known formula that will guarantee success in cooperative groups.

Various group dynamics operate that undermine the effectiveness of the cooperative approach, such as negative attitudes toward group work and student behaviours that are counter-productive to group success. Researchers concur that student attitudes, beliefs, values, and behaviours are influenced by natural peer contexts (Parr & Townsend, 2002). Thus, it can be argued that student attitudes and behaviours will also be influenced by cooperative group environments. Gillies and Ashman (1998) claim that only a few studies have attempted to identify the variables that mediate the relationship between group experiences and learning outcomes. Students' views on learning have increasingly become a focus of interest in recent years. Research has shown that students'

perceptions of learning are related to their methods of learning, as well as to the quality of their educational outcomes (Dart, Burnett, Purdie, Boulton-Lewis, Campbell, & Smith, 2000).

The purpose of this research is to examine how student attitudes toward cooperative and small group work impinge upon the effectiveness of this promising instructional approach. That is, what impact do student attitudes toward group work have on learning outcomes? How are student attitudes toward learning in groups related to group behaviours? Simply worded, what really goes on when students work cooperatively in the classroom and how does this influence how they interact, behave, learn, and achieve?

The aim of this research is to garner a better understanding of small group learning via two data sources; an instrument assessing student attitudes toward small group learning and an observation instrument capturing productive and counter-productive group behaviours and interactions. One main goal of this project is to further refine and validate an attitude instrument, the Student Attitudes toward Group Environments (SAGE) questionnaire, which was designed to capture both positive and negative features of working cooperatively. The SAGE questionnaire was developed for the author's master's research, in which the purpose was to create a comprehensive instrument that examined various aspects of the small group learning environment.

Typically, teachers have anecdotal information as to which aspects of small group learning elicit strong student attitudes, however there are few available instruments that systematically capture this type of data. Modifications and improvements made to small group learning based on student perceptions of the method rarely go beyond the single

classroom environment. Therefore, the intent of the SAGE questionnaire is threefold: First, to reliably tap areas of small group learning that include student views and concerns, theory, and existing classroom climate inventories. Second, to explore how attitudes are related to behavioural and learning outcomes. Finally, the study is designed to highlight problematic areas of small group learning, in which general recommendations can be made across grade levels, content areas, and contexts.

Significance and Implications of the Study

Cooperation among individuals is a necessary element of human life and can be seen in various aspects of our society. Individuals need to have necessary interpersonal, as well as academic skills, in order meet the demands of a society that welcomes diversity, a knowledge-based job market that is constantly evolving, and economic globalization (Ministère de l' Èducation du Québec, 2000). Employability skills such as being able to communicate, adapt, work with others, participate in projects and tasks, and demonstrate positive attitudes and behaviours can be applied beyond the workplace and used in everyday practice (The Conference Board of Canada, 2000). Quality group skills involve sharing of: ideas, personal and collective time management, and task preparation; cooperation amongst group members; collective responsibility both for the task and each other's welfare; and a willingness to be an active group participant (Petress, 2004). Since group work is being used in the workplace and in classrooms it is important to comprehend the nature of productive groups.

Based on the fact that interacting and problem-solving in small groups is critical in corporations, teachers are often strongly encouraged to prepare their students by having them work in small groups. Blumenfeld et al. (1996) claim that it is not easy to

transform the culture of schools to incorporate widespread use of small group learning. Incorporating small group work in classrooms is not a simple task. For group work to succeed, educators must consider group norms, tasks, help giving and seeking, accountability, and group composition. Cooper, Robinson, and McKinney (2002) mention issues such as group size/composition, group functions, group norms, group skills, group goals, and roles as being necessary for effective group functioning. Furthermore, key features of cooperative learning such as positive interdependence, individual accountability, face-to-face interaction, interpersonal skills, and group processing should be incorporated in the group activity so that each member contributes toward the group goal (Johnson & Johnson, 2000). Krol et al. (2002) state that despite the fact that cooperative learning has a strong theoretical and research support base, cooperative learning methods are not commonly used in classrooms. This is due to the fact that learning is typically viewed as an individualistic activity with whole class instruction seen as the dominant form of instruction. While many teachers are convinced of the benefits and usefulness of cooperation in the classroom, not all teachers persevere with the method.

Implementing cooperative learning successfully in classroom settings is not an easy feat. Teachers, in addition to having a clear purpose when using group work, must be aware of some of the issues that may occur that can hamper successful use. Therefore, it is imperative to have a better understanding of the dynamics that operate when students learn cooperatively in classroom settings. On many occasions students fail to reach their group goals, or reach their goals but have a negative group experience, thus preferring to work individually in the future (Mulryan, 1992).

Understanding how attitudes and behaviours influence group functioning may help illuminate why some groups are successful in their endeavors while other groups are not. The underlying assumption concerning attitudes is that they guide, influence, direct, shape, or predict actual behaviour (Kraus, 1995). Student attitudes toward small group learning are an important component of the educational process for at least two reasons. First, student attitudes are hypothesized to reflect the quality of a student's learning experience. Consequently, knowing student attitudes toward small group work can facilitate the development of better cooperative learning techniques and classroom implementations. Indeed, David Johnson, a cooperative learning expert, acknowledges that the procedures he recommends to educators are not always followed or implemented properly (Springer et al., 1999). Antil et al. (1998) also found discrepancies between teachers' and researcher-developers' ideas about cooperative learning. Many teachers who were implementing cooperative learning in their classrooms were using their own personal interpretations of the method and were not incorporating the key elements that make this method effective. Specifically, many teachers did not link individual accountability to group goals.

Abrami, Chambers, Poulsen, Kouros, Farrell, and d'Apollonia (1994) also found that teachers did not always emphasize important elements such as positive interdependence (i.e., everyone makes a specific contribution to the group's effort); individual accountability (i.e., each member of the group has to make a significant contribution to achieving the group's goal); interpersonal skills (i.e., leadership, conflict management, etc.), team building (i.e., nonacademic activities designed to relieve tension and help students get to know each other on a personal level), and reflection (i.e., group

members are asked to comment on their skills at working together) when they implemented cooperative learning in their classrooms. After sufficient training, the teachers were given the freedom to decide which strategies and materials to use with their students. Therefore, there was variability in their implementations of cooperative learning that may have contributed to unequal participation within the student groups. The way in which cooperative or small group learning is being implemented and the degree to which teachers persevere with this pedagogical approach may be enhanced by understanding the impact of student attitudes in this process.

A second reason why attitudes are important to the educational process is that student attitudes are hypothesized to influence learning behaviours. Attitudes formed by direct experience with the subject tend to predict behaviour (Fazio, 1986, as cited in Kraus, 1995). Attitudes, once formed, influence how students think, feel, and behave. Attitudes influence our choices of whom we will interact with and of the situations we will enter (Kraus, 1995). It is possible that negative attitudes toward group work may jeopardize group interactions and relationships, as well as student learning. The measurement of these student attitudes may yield important insights about how these attitudes enhance or hinder learning. Furthermore, student attitudes toward small group learning can be used to examine relationships between the nature of the small group environment and student cognitive and affective outcomes.

There is the need for future research to include more detailed descriptions of small group processes especially when reporting the effects of cooperative learning (Springer et al., 1999). Cohen (1994) states that observational studies that examine processes of interaction in relationship to outcome variables are valuable for they go

beyond the existing body of research that examines the effectiveness of small group learning over more traditional forms of learning.

Incorporating actual classroom observations of students interacting in small groups will provide a more insightful account of the behaviours exhibited during cooperative activities. Combining two sources of data, from the SAGE questionnaire and from an observation instrument (used via time-sampling), will lead to a more comprehensive understanding of the elements that contribute to effective group learning and potentially highlight issues that have not been previously addressed. Failure to acknowledge and address strengths and limitations of small group learning may eventually condemn a promising instructional method to failure. Consequently, students will fail to reap the documented cognitive and affective benefits of small group learning.

Potential Uses of the SAGE Questionnaire

The SAGE questionnaire assesses various aspects of the small group learning environment and has several potential uses for educators and small group researchers. Once validated the SAGE instrument may be used as: First, a diagnostic measure to help identify areas in which students have strong positive and negative attitudes toward learning in small groups. Second, a guide for developing, modifying, and implementing small group learning strategies effectively based on the information gleaned from this instrument. Third, a pre-post attitude measure in which attitude change can be measured. For example, do student attitudes become more positive after exposure to group work? Fourth, an evaluation tool to assess the degree of effectiveness and success of the small group learning approach. Finally, a predictive measure in which academic achievement and other learning outcomes can be identified.

Summary

Research has consistently shown that cooperatively learning promotes student learning, as well as, social relations in the classroom. When students learn cooperatively, student learning, productivity, and enjoyment are enhanced, in addition to, improving attitudes toward peers and toward learning. Attempts have been made by school board officials and by educators, as mandated by the Ministry of Education of Quebec, to make cooperative learning mainstream practice in classrooms. However, despite the positive research findings cooperative learning is not always a productive or enjoyable experience for students. While teachers may have anecdotal information as to the various aspects of small group learning that elicit strong reactions and attitudes in students, there is a need to capture this information systematically and reliably. The Student Attitudes toward Group Environments (SAGE) questionnaire was designed for this purpose. The SAGE measure has many potential uses, in particular it can be used as a diagnostic measure, as well as a predictive measure. That is, by understanding how attitudes are related to group behaviours and to academic achievement, insights can be learned that may enhance student learning, as well as, better cooperative learning implementations.

LITERATURE REVIEW

Attitudes

Most educational research that has examined attitudes toward school has used definitions proposed by social psychologists. Allport's classic definition of an attitude is "a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (Fishbein, 1967, p. 8). "Attitudes and beliefs are a subset of a group of constructs that name, define, and describe the structure and content of mental states that are thought to drive a person's actions" (Richardson, 1996, p. 102, as cited in Rimm-Kaufman & Sawyer, 2004). While many definitions of attitude have been proposed over the past years, most definitions emphasize several important characteristics of attitudes: (a) attitudes are based on a set of beliefs or experiences; (b) there is a predisposition to act; (c) there is an affective quality; and (d) evaluation is implied (attitude varies along a continuum from favourable to unfavourable). Although theoretical definitions of attitude are widely used, these definitions have had a minor influence in the way attitude research is carried out (Ajzen 2001; Breckler & Wiggins, 1989).

There has been general agreement that the concept of attitude has three major components: cognitive, affective, and behavioural (Pratkanis, 1989). The cognitive component pertains to the idea or category used by individuals when thinking about a social object. That is, the cognitive category consists of responses that reflect thoughts, perceptions, and information about the attitude object. The affective component refers to

the emotions that are generated when an individual thinks about a social object. The behavioural component deals with the predisposition to action (Triandis, 1971).

Defining attitude as having a cognitive, affective and behavioural component has led to ambiguities that have weakened the attitude construct (Greenwald, 1989). Researchers who believe that attitudes are comprised of these three components have been slow in creating procedures for assessing each of these three facets (Schibeci, 1984). According to Pratkanis (1989), the three component model is the most widely assumed and least understood model of attitude structure. It often appears in textbooks but is rarely used in actual research. A major hindrance is the lack of widespread agreement about the meaning of the terms. Most of the research has been devoted to validation, namely demonstrating that attitudes have three components. Very little research has been conducted on the three concept model and attitude change and behaviour prediction (Pratkanis & Aronson, 2001). Thus, the three component model of attitude does not have strong predictive or explanatory power.

Greenwald (1989) also agrees that the three component definition of attitude that was previously accepted is presently being abandoned. A main criticism is the fact that instruments (e.g., self-report, observations) can be used to measure the behavioural component or to measure behaviour that is controlled by the attitude and thus has led to ambiguity and multiple interpretations of the data. For example, there can be an attitude-behaviour relationship, a relationship between the behaviour component with the other two components, and a relationship between behaviour and the behaviour component of attitude.

Although there may be lack of consensus as to the components that comprise attitudes, measures such as Likert scales are designed to measure the affect component of attitude. That is, a Likert scale measures affect for or against an attitude object as a whole, based usually on a response continuum of approval or agreement (Gal, Ginsburg, & Schau, 1997). Since most attitude objects are multidimensional and elicit different levels of affect on different dimensions, some information about cognitive structure may be obtained. If items involve a behavioural intention or preference, information may also be derived about behaviour. However, it should be noted that measuring affective responses is the main goal while obtaining cognitive and behavioural information is incidental (Cafferty, 1992).

While attempts have been made to include attitude statements in the SAGE questionnaire (Likert scale) that tap the cognitive, affective, and behavioural components, the line of distinction between them is often subjective and arbitrary. For example "When I work in a group I do better quality work" may be viewed as representing a cognitive component. "My group members make me feel that I am not as smart as they are" an affective component. And "When I work in a group I end up doing most of the work" a behavioural component. Arguments can be made that the items tap more than one component. Therefore, no further attempts will be made in subsequent data collection or analyses to further probe the fine distinctions between the cognitive, affective, and behavioural elements of attitude.

Attitude Formation and Change

Various theories have been proposed suggesting how attitudes are formed, namely, social learning, classical and instrumental conditioning, modeling and direct experience. Most psychologists concur that attitudes are learned through exposure, conditioning, and socialization. Social learning refers to the gradual acquisition of language, attitudes and other socially approved values through reinforcement, observation, and other learning processes (Rajecki, 1990). This definition implies that one's interactions with others (e.g., fellow classmates) can affect attitudes toward various objects. In classical conditioning, there is a learning-through-association process that involves the pairing of stimuli. Attitudes can be conditioned this way as well. This can occur when an attitude object is frequently paired with other objects or experiences that are pleasant or unpleasant. In instrumental conditioning, rewards and punishments are commonly used to accomplish goals. For example, whenever responses are immediately followed by positive reinforcers (e.g., praise is given to a student for participating in class), these responses become more frequent in the future (e.g., likes to speak in groups). Modeling is another way in which attitudes are formed. This theory suggests that behaviours and attitudes are acquired by observing and imitating the actions of others. Finally, attitudes are formed by having direct experience or exposure to a particular object. Thus, individuals will tend to like objects/tasks that are familiar to them (Rajecki, 1990).

Attitude change is usually brought forth by some attempt at persuasion. The 1950's learning model suggests that attitude change is a learning process that is shaped by several characteristics. These include characteristics of: (a) the source of the message;

(b) the message; and (c) the receiver or target of the message (Zimbardo & Leippe, 1991). Pertaining to the source characteristic, persuasion is more likely when the source has: (a) credibility; (b) expertise; (c) trustworthiness; (d) likeability; (e) physical attractiveness; and (f) similarity. Pertaining to the message characteristic, 2-sided messages are more effective than 1-sided ones and when a strong emotion is aroused (e.g., fear). Finally, pertaining to receiver factors, there are situational factors that influence if the target audience will be persuaded. That is, if there is a discrepancy between the initial position and the position advocated (i.e., the larger the discrepancy the greater the attitude change).

The elaboration likelihood model states that attitude change depends upon the extent to which people think about the contents of persuasive arguments (Zimbardo & Leippe, 1991). This cognitive approach suggests that the thoughts that occur and are processed by an individual are of interest. This dual process theory argues that attitude change occurs via two routes: the central route or the peripheral route. The central route requires a thoughtful analysis of the presented issues. This approach involves logic for decision making. Therefore, the presentation of factual information will result in greater attitude change. On the other hand, the peripheral route requires little mental effort. Emotional factors, such as attractiveness or expertise prompt attitude change, especially if the receiver is not motivated to process the information (i.e., topic is not important) and when the receiver is not able to process the information (i.e., is distracted).

The heuristic model of attitude change proposes (similar to the elaboration model) that individuals use mental shortcuts or heuristics when they have low involvement with the topic of the message. Thus, systematic processing or a rational examination of the

arguments occurs when the topic is important to the receiver. Resistance to persuasive arguments is affected by a number of factors such as reactance, forewarning, and selective avoidance and exposure. Reactance is both an emotional and cognitive reaction to obvious attempts of persuasion. For example, when an individual feels that his/her rights are being threatened then he/she will experience attitude change in the opposite direction (e.g., if a student feels he is forced to work with members he does not like, he will resent working in groups). Forewarning pertains to the fact that a person knows he/she will encounter a persuasive argument and is armed with counter-arguments prior to the message (e.g., prior to a teacher espousing the benefits of cooperation, a student has a list of reasons why he/she does not like group work). Selective avoidance and exposure suggests that there is a tendency to direct attention away from information that challenges existing attitudes and give increased attention to information that supports held beliefs.

Not all attempts of attitude change stem from messages from others. Cognitive dissonance theory states that individuals experience unpleasant psychological effects when two conflicting attitudes are held at the same time or an attitude is inconsistent with one's behaviour (Zimbardo & Leippe, 1991). Attempts to reduce dissonance can lead to: conflicting cognitions, adding consonant cognitions, attitude change, rationalization, and denial. For example, if a student does not like group work but knows that cooperation is important, this may lead to: (a) conflicting cognitions (e.g., it is important to work in groups but I do not want to express my ideas in a group); (b) adding consonant cognitions, that is, stressing the negative side (e.g., my group members will make me feel stupid); (c) attitude change, that is, adopting a more extreme attitudinal position (e.g.,

working in groups is a waste of time); (d) rationalization, that is, changing the importance of the cognitions (e.g., if I participate in this group, it will leave me less time to learn on my own); and (e) denial, that is, claiming to participate (e.g., that fact that I am physically present is good enough).

Attitude Strength, Importance, and Stability

A host of variables influence the connection between attitudes and behaviour including: strength of the attitudes, their importance or relevance to the behaviour in question, and their accessibility in memory. Although there is no single conceptualization of attitude strength, researchers have identified various aspects of attitude strength, ranging from amount of knowledge an individual has about an issue, personal importance of the issue, to extremity of a person's attitude (Pomerantz, Chaiken, & Tordesillas, 1995). Strong attitudes lead to selective cognitive processing, are resistant to change, are persistent over time, and predict behaviour. The amount of knowledge an individual has about an issue is associated with greater resistance to social influence and attitudes that are more predictive of behaviour. Personal importance is also associated with resistance to social influence and prediction of behaviour, as well as attitude stability and greater selective perception of attitude-relevant information. Similar to knowledge and importance, extreme attitudes are resistant to social influence and are more predictive of behaviour (Pomerantz, et al.). Furthermore, extreme attitudes have been linked to selective judgment and attitude polarization. That is, when confronted with mixed information about an issue, people with extreme attitudes are more likely to evaluate attitude-congruent information more positively than incongruent information, and their attitudes are more likely to polarize (i.e., become more extreme).

Attitude importance is a crucial dimension in determining attitude strength. Attitudes that people consider personally important are firmly crystallized and exert strong influence on social perception and behaviour (Boninger, Berent, & Krosnick, 1995). Important attitudes are usually resistant to change and are stable over time. Self-interest, social identification, and values may determine why an attitude becomes important to an individual and may lead to subsequent behaviour (Boninger et al., 1995). Zuwernik and Devine's (1996) findings support the claim that strong, personally important attitudes are difficult to change and the process of resistance is both cognitive and affective. They found that individuals who considered their attitudes high in personal importance (versus low) were more resistant to arguments that were counter to their attitude.

Attitudes and Behaviour

The relationship between attitudes and behaviour has been the topic of considerable debate. The most fundamental assumption underling the attitude concept is the notion that "attitudes, in some way, guide, influence, direct, shape, or predict actual behaviour" (Kraus, 1995, p. 58). LaPiere's classic study in 1934 was the first to show that attitudes do not necessarily predict behaviour. In his investigation the researcher and a Chinese couple asked for service in various establishments and were only refused service once. However, six months later when LaPiere wrote to the same establishments, over 90% of the proprietors stated that they would refuse to serve the Chinese couple. LaPiere claimed that attitudes could be easily measured but were irrelevant in predicting behaviour.

During the 1960's the assumption that attitudes were related to behaviours was further questioned when Wicker (1969, as cited in Kraus, 1995) reviewed 47 studies of attitudes and behaviours and concluded that attitude-behaviour correlations were rarely above .30 and that attitudes rarely account for more than 10% of the behavioural variance. Two explanations were put forth as to why there was inconsistency between attitudes and behaviour: methodological explanations (poor measurement techniques) and moderator variable explanations (level of consistency depends on other variables) (Kraus). The methodological and moderator variable explanations helped explain the low correlation between attitudes and behaviour. Thus, by being able to identify and solve issues based on these two explanations, attitude theorists felt a renewed optimism about the attitude-behaviour relationship.

Kraus conducted a meta-analysis of 88 attitude-behaviour studies that revealed that attitudes significantly and substantially predict future behaviour (mean $r = .38$; combined $p < .001$). Relatively large and significant moderating effects were found for the attitudinal variables of attitude certainty, stability, accessibility, affective-cognitive consistency, and direct experience. Questions still remain as to the magnitude of the attitude-behaviour correlation. Kraus concluded that statistically significant correlations may not be particularly large, that is, very small correlations may be highly significant with a very large sample size. Kraus also defended the fact that although the findings of his meta-analysis show that attitudes account for only 14% of the variance in behaviour his findings do not support the earlier work of Wicker. While Wicker stated that attitude-behaviour correlations are rarely over .30, Kraus's findings show that 52% of attitude-behaviour correlations were above .30 and 25% were .50 or greater.

Kraus claims that two variables that contribute to high attitude-behaviour correlations are self-report behaviour measures and use of non-students as participants. Self-reports of behaviour may be inaccurate because participants may deliberately lie to appear consistent with their attitudes or may not remember their actual behaviour and infer their behaviour from their current attitudes. The use of students as participants may lead to low attitude-behaviour correlations because their attitudes are still developing, based on poor information, and not based on direct experience. Therefore, correlations between attitudes and behaviour may be higher when investigating non-students. However, in some instances, such as in the case of this study, students are in the best position to express their attitudes due to the direct experiences they have in their classrooms. Furthermore, he found that attitude-behaviour correlations for field studies did not differ from those of lab studies. While attitudes and behaviour will be more highly correlated if they are both measured at corresponding levels of specificity, this may not always be the case. For example, a study looking at attitudes toward losing weight in the next six weeks and trying to lose weight in the next six weeks did not correlate to actual weight loss six weeks later. Kraus maintains that although moderator variables have been found to influence the attitude-behaviour relationship, very little empirical research has addressed the situations in which attitudes will and will not predict behaviour.

Kraus contends that in the past, a lack of extremely strong and consistent attitude-behaviour correlations was thought to invalidate the concept of attitude. The problem was largely due to the fact that behaviour was seen as a criterion variable against which the validity of the attitude concept could be tested. He states, "clearly, attitudes are not

synonymous with behaviour; attitudes should not be used as an easily measured substitute for behaviour measures, nor does attitude theory suggest that attitudes will be the sole determinant of behaviour" (p. 71). Kraus concludes that while there is a relationship between attitudes and behaviour, sometimes the relationship will be large and sometimes small, and the relationship will be significantly influenced by other variables. He answers the question "To what extent do attitudes predict future behaviour?" by stating that the question is complex and multifaceted and that there is no simple answer.

The multifaceted nature of attitudes is important to consider since one of the main goals of this study is to investigate the relationship between student attitudes and behaviours. It is difficult to discern what experiences or cognitions students are accessing at the time that they respond to an attitude item or how stability of an attitude may be influenced by an external unrelated factor such as simply being in a bad mood when the questionnaire is being administered, thus, making the link between attitudes and behaviour more tenuous. Regardless, more systematic information is needed on how student attitudes and behaviours are related in the cooperative classroom.

Operational Definition of Attitude

For the purpose of this research an attitude is defined as the manner in which one thinks, feels and behaves toward an object, an idea, a person or a way of doing things. This definition also guided the Master's research of the author. However, no further distinctions will be made between the cognitive, affective, and behavioural components of attitude.

Cooperative Learning

Cooperative learning exists when students work together to accomplish shared learning goals (Johnson et al., 2000). Cooperative learning is a collection of instructional strategies that encourage students working in small groups to contribute their skills and abilities to achieve a group goal (Johnson & Johnson, 2000; Slavin, 1990). Cooperative learning activities are structured in such a way that each member of the group is not only accountable for their own learning but also for the learning of the other members. Cooperative efforts result in students: (a) striving for mutual benefit so that all group members gain from each other's efforts; (b) recognizing that all group members share a common fate; (c) knowing that one's performance is mutually caused by oneself and one's group members; and (d) feeling proud and jointly celebrating when a member is recognized for achievement (Abrami, Chambers, Poulsen, De Simone, d' Apollonia, & Howden, 1995).

Many researchers and educators have become interested in cooperative learning because it emphasizes humanistic educational methods and prosocial student outcomes, but also recognizes the importance of achieving both cognitive and affective gains instead of sacrificing one for another (Slavin, 1990). While many cooperative learning methods have been developed (e.g., Student Teams-Achievement Divisions (STAD), Teams-Games-Tournaments (TGT), Jigsaw) they vary in terms of philosophies, details, and applications. Some methods promote humanistic principles such as learning in a nonthreatening environment that fosters interdependence, creativity and self-assuredness, whereas other strategies promote cognitive elaboration principles that contend that learning is enhanced when students give and receive elaborated information (Abrami et

al., 1995). In most methods (e.g., TGT, STAD, Jigsaw) students are assigned by the teacher to teams that are heterogeneous in gender, race, academic performance, whereas in other methods students choose their own groups (e.g., Group-Investigation). In some techniques the group reward is explicit (e.g., TGT); in others students are simply asked to do their best as a group (e.g., Group-Investigation). In some methods students are clearly individually accountable for their contributions (e.g., STAD), but in others there is a group product in which individual contributions are difficult to distinguish (e.g., Group Investigation). Most methods provide a well-structured set of learning objectives and tasks. However almost all methods share these characteristics: (a) students work in small groups (4-6 members) that remain stable for many weeks (i.e., group composition does not change); (b) students are encouraged to help their fellow group members learn the material or to perform a group task; and (c) in most techniques, students are given rewards based on their group performance (Slavin, 1990).

According to Johnson and Johnson (1997) in order for cooperative learning to be successful in the classroom five essential elements should be present to some degree: positive interdependence, face-to-face interaction, individual accountability, interpersonal and small group skills, and group processing. Positive interdependence exists when students perceive that they are linked with their group members in a way in which they cannot succeed unless their members also succeed. That is, students must learn the material themselves, as well as ensure that their group members understand the material. Common goals, shared tasks, roles, and resources, and group rewards are techniques frequently used to promote interdependence between group members.

The second requirement, face-to-face interaction, may be defined as students encouraging and helping each other to achieve, complete tasks, and produce in order to reach the group's goals. While students interact they may help each other, share resources and materials, process information more effectively, provide feedback, challenge, and motivate each other. Individual accountability is another important feature of cooperative learning. When individual accountability is incorporated in the task it ensures that every person in the group is responsible for contributing to the process and the product. Therefore, the division of the task and the evaluation of the students is critical because it ensures that each member of the group is actively participating in the group functioning.

The fourth fundamental component of cooperative learning is the appropriate use of interpersonal and small-group skills. In order for students to achieve their group goal they must: (a) get to know and trust each other; (b) communicate clearly; (c) support and accept each other; and (d) and resolve conflict in a positive manner (Johnson & Johnson, 2000). Finally, group processing is necessary for effective group work. Group members must have the time to reflect on how the group goal was achieved, as well as provide feedback on how the members functioned as a team. Therefore, problem areas can be identified and addressed and participation can be facilitated in the future.

Not everyone agrees that these five elements must be present for cooperative learning to be successful. Slavin (1990) and Kagan (1990) both experts in the area of cooperative learning conclude that positive interdependence (specifically, group rewards) and individual accountability are the two key elements. While face-to-face interaction is employed in their cooperative models they do not explicitly state it as being a key element. As for interpersonal and small-group skills and group processing, they are

viewed as facilitating group work but not really necessary as long as positive interdependence and individual accountability are present. Cohen (1994), on the other hand, looks at group learning from a sociological rather than psychological framework and emphasizes the nature of the task and delegation of authority. Cohen's four criteria for complex instruction include: open-ended tasks that emphasize higher order thinking skills; group tasks that require participation from the other members; multiple tasks that are related to one theme so that each member has the opportunity to experience more than one task; and roles assigned to each group member.

Although various methods of cooperative learning have been developed and their essential elements have been delineated, concerns have been recently raised about the successful use of these methods and features in actual classroom practice (Krol et al., 2002). Teachers "are rarely found to set group goals, hold students individually accountable for their contribution to group work, or teach the social-interaction, communication, and problem-solving skills necessary for effective cooperative work (Krol et al., p. 38). Abrami, Poulsen, and Chambers (2004) also found in their course of research that positive interdependence and individual accountability occurred in only half of the classrooms where cooperative learning was implemented. Antil et al. (1998) conclude that teachers do not always implement cooperative learning in their classrooms the way in which the scholarly literature recommends. While interviewing teachers, they found that some teachers were reluctant to label the group learning in their classrooms as cooperative learning because the teachers acknowledged that they did not use "formal" cooperative learning. Johnson et al. (2000) state, "cooperative learning is a generic term that refers to numerous methods of organizing and conducting instruction" (p. 2). They

conclude that teachers use cooperative learning in so many different ways that the operationalizations cannot all be listed. Cohen's (1994) review of cooperative learning research led her to define cooperative learning as "students working together in a group small enough that everyone can participate on a collective task that has been clearly assigned" (p. 3). Cohen states that the definition is broad in that it includes collaborative learning, cooperative learning, and group work.

Collaborative learning is another method that uses peer interaction to promote learning. The underlying premise for both collaborative and cooperative learning is social constructivism. Knowledge is discovered by students and changed into concepts that students can understand and relate to. Students need to actively participate in order to learn the content, rather than passively accepting the information presented by the teacher. While collaborative and cooperative learning are often used interchangeably, collaborative learning is a philosophy of interaction, while cooperative learning is a structure of interaction used to facilitate the attainment of the group goal (Panitz, 1997). Collaborative learning is a philosophy of interaction in which members are responsible for their actions, including learning and respecting the abilities and contributions of their peers. In a collaborative learning environment, the group has greater autonomy in the choice of its goals, tasks, roles, and processes. Whereas, in a cooperative learning environment the teacher typically controls the goals, tasks, roles, processes, and rewards the group (Panitz, 1997).

Collaborative learning focuses on dialogue, the contributions of group members, as well as consensus building. Group processing is controlled by the students. In cooperative learning settings the teacher: designs the task and the group structure for

accomplishing the group task; assigns students to groups (2 to 5 members); explains the task, content, and group procedures; intervenes only when necessary; evaluates the performance of each student; and asks the groups to reflect on how well they worked as a team (Johnson & Johnson, 2000). In cooperative learning groups students understand that: (a) they are responsible for each other's learning; and (b) they are invested in each other's success. Cooperative learning is also different from regular group work due to the fact that positive interdependence and individual accountability are structured into the group process. In regular group learning students are assigned to groups and are instructed to work together, however, no structured elements are imposed on the group functioning.

Terms such as small group learning and cooperative learning are used interchangeably in this research, thus, not making distinctions between cooperative and unstructured small group practices. The reason for this is twofold: (a) evidence suggests that although educators are using cooperative learning it may be "watered-down" thus resembling group work (conversely, in other classrooms common group work may be highly structured but not be labelled cooperative learning by the teacher); and (b) this will allow for the SAGE questionnaire to be administered in a wide range of group environments, settings, and contexts.

Operational Definition of Small Group Work

In this study small group work is defined as 2 to 6 students working together: to learn new material, to review material, and to complete assignments that are part of a course. This may include: students asking each other questions, working on different aspects of the task, taking on different roles (e.g., reporter), and sharing resources (e.g.,

computers). Students may or may not be assigned a group grade based on group work.

Student Attitudes and Cooperative Learning

Countless research studies indicate that students who work cooperatively, as opposed to competitively or individually, learn more, find the content more enjoyable, feel more competent as learners, and have more positive feelings towards their classmates and teachers (Johnson et al., 1995). Previous research has shown that cooperative learning experiences have positive effects on student attitudes toward peers and thus, social relationships are enhanced in the classroom (Johnson & Johnson, 1999). The positive attitudes toward each other include mutual liking, mutual concern, friendliness, attentiveness, feeling of obligation to other students and desire to win the respect of other students (Cohen, 1996). Since students interact and communicate when they work together in the classroom their attitudes toward learning and school are influenced (Sharan, 1990).

Cooperative learning has been found to have a positive impact on the ability to work collaboratively with others and to enjoy the cooperative experience. Typically, more friendships are made when students are part of a group and when there is a sense of cohesion among members. Stevens and Slavin (1995) found that students in a cooperative elementary school listed significantly more friends than did students in more traditional (i.e., competitive) schools, indicating more enhanced peer relations in the cooperative school. Since students work towards a common goal there is more meaningful interaction, in comparison to typical classrooms where interactions tend to be more casual. Their findings suggest that as groups change over time, students collaborate with

a variety of students in the class, leading to improved peer relations in the class, as well as an increase in the number of students' friendships.

In another recent study, Holtfreter and Holtfreter (2002) investigated the perceptions of students in an accounting class regarding their attitudes and beliefs about cooperative learning versus traditional individual learning. The results of the study indicated that the students favored the cooperative over the individual approach to learning. Students "looked forward to class, felt more actively involved, were less frustrated and impatient, got confused less often, felt more intellectually challenged, were closer to their classmates, and felt their classmates participated more actively in the cooperative rather than the lecture/discussion approach to learning" (p. 3). Abu and Flowers (1997) however found no difference between the attitudes of students who had experienced the cooperative learning method STAD and the attitudes of students taught by noncooperative methods. Furthermore, there were no differences in student achievement and retention. Interestingly, Horn, Collier, Oxford, Bond, and Dansereau (1998) found that students who enjoyed collaborative efforts and liked their partners learned less than students who did not prefer cooperative activities. They conclude that due to the fact that students like interacting with their group members they may engage in off-task behaviour, such as casual conversations, rather than spending time learning the material.

While much has been written about the benefits of cooperative learning on academic achievement and student attitudes most studies were conducted in grade 2-9 classrooms (Stevens & Slavin, 1995). More information on older students (namely high school and CEGEP students) attitudes is needed since more academic and social conflicts

may occur with this age group. Ford (1991) states that teenagers can be very cruel to those outside their clique, therefore, forcing students to work in such a situation may only exacerbate the problem of learning. Gentry, Gable, and Rizza (2002) claim that there are often negative changes in achievement, attitude, and behaviour as students progress from elementary to high school with such changes influenced by classroom environments and peer groups. Their findings report that middle school students found their classroom activities less interesting and enjoyable, with fewer opportunities for choice, than did elementary students. The work of Gentry et al. (2002) provide student insights concerning their views of their class activities regarding affective areas related to learning. They claim that if teachers would incorporate more interest, choice, and enjoyment in curricular and instructional planning student's satisfaction with school, motivation, and eventually achievement might increase.

Research on cooperative learning has shown that cooperation in the classroom promotes social development, moral reasoning, perspective-taking, interpersonal attraction, social support, friendships, reduction of stereotypes and prejudice, valuing differences, psychological health, self-esteem, social competencies, and enhances the overall quality of the learning environment (Johnson et al., 2000). Specifically, evidence suggests that when cooperation is present in the classroom students express that there are more committed and caring feelings among students. Caring and committed friendships come from a sense of mutual accomplishment, mutual pride in group work, and the bonding that results from joint efforts (Johnson & Johnson, 2000). The more students care for one another the harder they will work to reach the group learning goal, in turn, group success leads to increased social competencies and self-esteem. Parr and Townsend

(2002) mention beliefs about academic competence, attitudes to learning, academic task values, and expectations for success as processes and mechanisms that operate in learning environments that influence achievement. More insights are needed on the impact that student attitudes have on learning, especially small group learning. Working with others may illicit strong positive and negative student attitudes. How in turn these attitudes manifest themselves in the classroom and influence group behaviours and participation and ultimately learning are important to understand and address.

Student attitudes and perceptions toward cooperative learning are important to consider when designing effective educational experiences. School reform policies often emphasize academic measures, while the role of student attitudes in school success tends to be neglected (Gentry et al., 2002). By examining small group learning from the perspectives of the students, educators and researchers can gain insights concerning how students view their group activities, and these views can be taken into consideration when trying to improve learning and productivity in the classroom.

Interactive Behaviours and Cooperative Learning

Although there is much research documenting both the academic and social benefits of cooperative learning, few researchers have examined the nature of student interactions during cooperative group experiences (McManus & Gettinger, 1996). Researchers have hypothesized that certain interactive processes are likely to occur during cooperative learning; however, the identification of specific behaviours is often based on anecdotal data and narrative reports, rather than on systematic observations. As a result McManus and Gettinger state that there is little knowledge concerning verbal

interactions that actually occur when cooperative learning is implemented in naturalistic classroom contexts.

Student interactions are critical to the success of cooperative learning because interactions that occur in groups facilitate learning (Gillies, 2002). When students interact in groups they seek procedural and content information thus increasing the chance of exchanging helpful and relevant information. Previous studies that addressed student interactions in small groups found that helping behaviours promote student learning. Behaviours that enhance learning in small groups are: giving and receiving information, asking for and receiving help, providing verbal support, and generally remaining on-task until the task is completed (Hertz-Lazarowitz, 1993; Webb, 1989, 1991; Webb & Mastergeorge, 2003). Research shows that students learn more by giving elaborated help to others and learn less by receiving low-level elaboration from others (Webb & Farivar, 1993). Webb (1991) examined specific task-related verbal interactions that occur during small group learning, specifically giving help and receiving help. Webb found that students who gave high-level elaborated explanations (as opposed to simply providing the answer to a problem) made the greatest learning gains. Webb also found that in order for the received help to be beneficial to the student who requested it, certain factors must apply. That is, the student assistance must be timely, at an appropriate level of elaboration, and understandable and relevant to the requester's question or problem. In addition, the requester must accept and apply the information or answer. Webb, Troper, and Fall (1995) found that achievement scores were higher on mathematical tasks when students were able to apply the elaborated help they received constructively. Extending

previous findings, Webb and Mastergeorge (2003) results indicated that students who learned how to solve task problems received high-level help during group work.

Many experts have maintained that cooperative learning encourages students to engage in verbal learning behaviours, thus enhancing achievement (Webb, 1989). That is, when working in groups students discuss material, there is oral rehearsal of information, and students tend to support, provide feedback, and encourage each other. Giving explanations requires "the reorganization and clarification of the material to be learned, a process that may help the giver develop new perspectives, construct more elaborate cognitive understandings, and, in so doing, often learn the material better than before" (Gillies, 2002, p. 16).

Webb's (1982) earlier work on group interaction and achievement found that an individual's experience in the group can have a substantial effect on achievement. The results indicated that: (a) asking a question and receiving no answer was detrimental to achievement; (b) introverted students were more likely than extroverted students to receive no answers to their questions; and (c) whether they enjoyed group work did not relate to any group interaction variable.

Kouros, d'Apollonia, Abrami, Poulsen, and Howe (1993) observed small group interactions via time-sampling in order to investigate: (a) the extent of involvement and task engagement demonstrated by low, medium, and high performing CEGEP students in homogeneous and heterogeneous groups; and (b) if within-group status differentials affect the way in which students carry out a group task. The results suggested that high performing and female students most often give help to the other group members. Low performing males were off-task more often than any other students. High performing

students received more help in homogeneous groups, while there were no differences in receiving help in heterogeneous groups. The results suggested that group members, who were perceived as having low status in the group, gave and received less information, gave less help, and tended to listen passively to other students interacting. Poulsen, Abrami, Kouros, and Chambers (1993) collected narrative observational data to examine the nature of behaviours that high school students engaged in while working in groups. The proportional frequencies of behaviours indicated that, when assigned to work in groups, students were engaged most often in on-task interactions with group members, usually verifying answers and explaining or elaborating on solutions to assigned problems.

Gillies (1999) examined helping behaviours of grade 4 students a year after they had training and experience working in cooperative groups. The following behaviours were examined: (a) cooperative (all behaviour that was task oriented); (b) noncooperative (noncompliance); (c) individual task oriented (working on task alone); and (d) individual non-task (confusion and nonparticipation). The seven verbal interactions observed were: (a) directives; (b) unsolicited explanations; (c) unsolicited terminal responses; (d) interruptions; (e) solicited explanations; (f) solicited terminal responses; and (g) nonspecific interactions. The results indicated that students who had received cooperative learning training the year before were more cooperative than their peers in the untrained group. The students with group experience provided more unsolicited explanations thus showing that they were aware that there was a need to provide help even if group members did not request it. Furthermore, students from the trained group used higher-

level language strategies such as providing specific information to help explain a point and more detailed explanations than the students in untrained groups.

McManus and Gettinger (1996) explored the frequency and types of observed interactive behaviour among elementary students, as well as teacher and student evaluations of cooperative learning. Group activities were videotaped in two classrooms over a 6-week period to obtain a sample of students' observable interactions and behaviours over time. Coders used an interval recording method to note the occurrence of 14 specific behaviours. The 14 behaviours were grouped into five categories: (a) teaching/learning; (b) positive social interaction; (c) noninteractive behaviour; (d) negative social interaction; and (e) teacher interaction. Results from the observations revealed that the majority of student interactions were directly related to teaching and learning. Behaviours such as listening to another student or watching a student demonstrate how to complete a task occurred most frequently during group activities. Teacher and student evaluations of cooperative learning revealed that both teachers and students attributed academic and social benefits to working in groups. Of the three outcome domains (academic, social, attitude), students rated academic benefits highest, whereas teachers rated social benefits highest. Despite the overall positive ratings of cooperative learning, both teachers and students stated that there were some negative aspects of working in groups. Some teachers reported that on-task behaviour among students declined when students worked in groups. Students stated that there were conflicts in the groups, such as arguing among group members and being frustrated when group members did not listen to each other.

Mulryan's (1992) study investigating attending and participating behaviours in cooperative small groups found that many students, mainly low achievers, remained quite passive while working cooperatively. Student interviews revealed that some high achievers disliked or even avoided giving help to their low achieving group members. This was particularly the case when students used speed of task completion as an important criterion of group success. On some occasions, competent group members may have excluded low achievers to avoid the need for explanations or to avoid unnecessary delays in completing the task.

A host of student behaviours and interactions occur when students work cooperatively with their peers. While some behaviours may enhance learning in groups (e.g., giving and receiving elaborated help) other behaviours (e.g., putdowns or withdrawing) may be detrimental to the success of the group, as well as to actual students. Therefore, closer scrutiny of the types of behaviours that occur during small group learning is needed in order to understand why some students thrive in a cooperative setting and other students do not. The need to systematically and reliably observe and code student group behaviours and interactions is clear if small group learning is to be used effectively in classroom environments.

Stages of Group Development

Theories of group development may help explain the problems that groups encounter as well as the necessary factors for groups to be productive and effective. Through the years over one hundred theories of group development have been proposed, varying in terms of the number of stages that the groups go through and the labels of the stages. For example, Bions's work on emotion theory of group development includes

dependency, fight-flight and pairing while Lacoursiere's life cycle of groups includes orientation, dissatisfaction, resolution, production, and termination (Oyster, 2000; Kass, 1996). However, many models suggest that certain interpersonal outcomes must be achieved, especially in groups that exist for a prolonged period of time. Most theories agree that group members must discover who the other group members are, achieve a certain amount of interdependence, and deal with conflict (Forsyth, 1999).

Many of the theories highlight the five stages identified in Tuckman's well-known model developed in the late 1970's: forming, storming, norming, performing, and adjourning (Napier & Gershenfeld, 2004). During the first stage labeled forming, there is some initial discomfort as individuals encounter a new situation. Members try to learn what is expected in the group so that they can become accepted by the other members. The storming phase follows next, as individuals react to the demands of what has to be done, question authority, confront their various differences and try to manage conflict. In the norming stage, the group norms are established as well as the behaviours that are necessary to accomplish the task. Group cohesion is also increased. In the performing stage the group works cooperatively in order to achieve the group goals. This is possible if issues of membership, roles, and leadership have been successfully dealt with by the group. Finally, the group reaches the adjourning stage when the task is almost completed and there is closure in terms of the task and member relationships.

Worchel, Coutant-Sassic, and Grossman (1992) propose that there are six stages to group development (period of discontent, precipitating event, group identification, group productivity, individuation and decay). During the first stage of discontent, many individuals feel that their group is not meeting their needs. These people tend to feel

alienated and that they are not part of the group. There is unequal participation in the group; a few members participate actively while the majority of the members withdraw their involvement. How long this period lasts depends on the members that have the power in the group. The members who have power may either ignore the problems that the group is encountering, or react in ways that will secure their power. In order for the group to survive, attention must be given to the source of the group discontent. In the next stage, a precipitating event will bring members together. Whatever the event, it seems to have certain characteristics: (a) it is clear and distinctive; (b) it symbolizes issues that lead to dissatisfaction with the group; (c) member's reaction to the event separates loyal members from alienated members; and (d) alienated members become hopeful that the situation can change.

During the group identification stage, group norms and structure is determined, as is leadership. As members begin to identify with the group, attention then turns to group productivity. During the group productivity stage, group goals and tasks are identified. Leaders become task oriented and there is less emphasis on socio-emotional issues. The group actively seeks members that have the ability to perform specific tasks. All group members are expected to contribute and rewards are shared equally among members. Next during the individuation stage, attention shifts to the individual group member. Members begin to negotiate with the group to increase task efforts to meet personal goals. Individuals begin to demand personal recognition and base their satisfaction on their views of what they deserve from the group. Finally, during the decaying stage, the group begins to disintegrate. Members begin to question the advantages of being in a group. Failure is blamed on the group and its leaders and success is attributed to personal

effort. Distrust increases among members and there may be a struggle for power within the group.

Groups, like individuals, develop through predictable stages of growth over time. Each phase of group evolution has definite characteristics. In synthesizing the many views of group development, Napier and Gershenfeld (2004) purport that the main phases of group development are the following: the beginning, movement toward confrontation, compromise and harmony, reassessment, resolution, and recycling. In the beginning individuals have expectations of what will occur in the group even before they attend the group. People bring to the group their personal needs and history as well as their experiences in previous groups. In the beginning people tend to keep their feelings to themselves until they know the situation and want some structure so that they know what is required of them. Faced with a new situation, individuals seek out clues that will make them part of the group. This is a time to become oriented with the norms and expectations of the group.

During the first phase, individuals are preoccupied with their role and position in the group, rather than on the task at hand. Shortly after, during the movement toward the confrontation phase, the focus shifts to the issue of power and leadership in the group. During the initial period of unfamiliarity, some members become dependent and seek the approval of the leader, while others become disenchanted with the leadership style and try to exert power and influence over the group. During this stage there is conflict over the manner in which things are done, how decisions are made and by whom, and issues of control. As members become more familiar with each other and with the situation, they reveal more characteristic behaviours and their true selves. At this point mistrust between

members occurs as well as new alliances within the group. In this phase, feelings of anger and frustration may surface as members deal with issues of status, prestige, and power. The task at hand becomes secondary as individuals try to establish their role and position in the group. While some members become more assertive at this point, other members may withdraw from participating in the group. What will likely follow is some type of confrontation followed by resolution and attempts to get the group focused on the task.

During the compromise and harmony phase, a confrontation over work and personal issues will occur when some members who are willing to compromise realize that the group is not progressing. These members try to get the others talking again and try to resolve issues that are causing strife in the group. Members realize that in order for the group to become more productive there must be a more amicable atmosphere. At this point there is a general feeling of harmony as group members take the time to listen to one another and try to eliminate previous negative feelings. Members become less competitive with one another and there is a genuine effort to work harmoniously together. However, while members are encouraged to be honest and express their views, there is an underlying message that they should not say or do things that may rock this new found peace and stability. However, the consequence of not expressing tensions is less participant involvement and overall interest. Instead of the group becoming more productive, this fake sense of harmony makes the group become less efficient. Central issues may not be addressed and it may take longer to come to decisions. Tensions increase and disillusionment sets in as members come to the realization that the group's efforts to establish harmony have not succeeded.

The group reaches the reassessment phase when members realize that they are not working in a productive work climate and seek new alternatives. One solution is to impose restrictions that would help the decision making and with redirecting the group toward the task. However, this would not get to the core of the problem that the group may be facing. If the group takes the time to delve more deeply into the problems that the group is encountering, then issues of member roles, leadership, and communication will come to the surface, as well as individual behaviours that helped or hindered the group. If the group does take the time to explore these issues, then the members must face the question how honest they must be with one another in order to accomplish their task effectively.

Although the previous compromise and harmony phase did not deal with key issues, it did allow for members to become less competitive, less formal, and more familiar with one another. However, during the reassessment phase, members are allowed to express negative feelings and issues are resolved more realistically than before. Members realize that in order to be effective group members they must become more interdependent. The task is usually divided so that each member can participate, thus ensuring that there is individual accountability and personal responsibility within the group. As open communication increases so does productivity as members undertake necessary tasks that suit their skills and interests, as well as share leadership. A key factor is that each member is accountable, that is, members know what is expected of them, their expectations are shared by the group, and there is some measure that indicates if the expectations were met. However, there is the possibility that there may be a period of intense conflict as issues and tensions that were previously suppressed are expressed.

Groups at this point realize that if they are to survive they must be honest and share responsibility, as well as a willingness to deal with task and personal issues.

Resolution and recycling is the final phase of group development. The group at this stage is quite productive, members tend to feel good about themselves and the group as they succeed in the task. However, effective groups are not necessarily harmonious and free of conflict. The group may encounter problems and regress again. However, as groups develop they need less time and energy to resolve conflicts. If a crisis does occur such as an earlier deadline or a controversial new idea, then there may be a period of readjustment and emerging of old behaviours that may not be helpful. Communication may break down and tensions may mount. Some groups never develop problem-solving methods that would allow them to grow and function effectively. These groups remain trapped in a nonproductive pattern and go through motions without improving or growing. On the other hand, mature groups will confront the factors that are causing the conflict and will try to come up with solutions. While all groups may become immobilized at some point of development, some groups remain stagnant whereas others will continue to grow and evolve. Groups that have difficulty developing and functioning are those that have not developed mechanisms to deal with conflict and with unresolved issues, thus, leading to repressed emotions and group functioning that is at a superficial level.

Student Attitudes and Group Development

Each phase of group evolution has definite characteristics. However, not all groups go through all the phases; some groups may regress, some may go on, while other groups become stagnant. What is clear, however, is that some form of conflict is

inevitable when individuals come together to work on a group task. While there is variability from group to group as to how intense the conflict is or how frequently it occurs, one thing remains constant is that the conflict must be dealt with efficiently and effectively in order for the group to succeed. Thus, it can be concluded that strong negative attitudes may be elicited at some point during the group functioning. If the conflict in the group remains unresolved negative behaviours may emerge and hinder productivity in the group. Frustration can result from unequal participation of members, unequal power, and the inability to express viewpoints. In a high school environment in particular, negative feelings may arise if a student does not like working with a particular member, feels his/her ideas are ridiculed, or attempts to contribute are consistently ignored. Left unchecked, the conflict and frustration may lead to individuals exhibiting off-task behaviours or withdrawing completely from the group.

Strong negative attitudes towards group work may hinder group productivity, if students have had negative group experiences in the past. As Napier and Gershenfeld (2004) indicate all groups go through a beginning phase where members have certain expectations as to what to expect from the group experience. They state that individuals bring with them their personal history and previous experiences. Therefore, previous experiences may influence how students view group work even before they have the opportunity to work with their classmates. Due to the negative attitudes students may be resistant to working with their classmates on an academic group task.

Research on group dynamics indicate that there is a "norming" period in which group members must scope out the culture of the group and express individual opinions. For group work to succeed group norms must be considered. Blumenfeld et al. (1996)

state that effective group work requires students to share ideas, take risks, disagree with and listen to others, and generate and reconcile points of view. These norms are not always present in classroom settings. Students are used to working individually, being rewarded for right answers, and competing with others for grades (Blumenfeld et al.). Students do not always act prosocially towards their group members nor do they cooperate with others when placed in cooperative groups. One danger is unequal student contribution. Some students may dominate discussions, pressure others to accept their views and ideas, or force conclusions on the group. Examining the role of student attitudes is necessary in order to see how students view issues of conflict, leadership, and unequal participation that will undoubtedly arise when they work cooperatively with others in the classroom.

Factors that Contribute to Effective Group Functioning

In order for a group to be effective, there must be a climate of cooperation, open communication, equal participation, and early detection of problems in order to derive and implement appropriate solutions (Napier & Gershenfeld, 2004). Johnson and Johnson (1997) contend that in order for groups to be effective there must be clear goals and there must be 2-way communication. There must be a climate where members are allowed to express their ideas and feelings. Group members participate equally and leadership is distributed among all group members. Ability is the main determinant of influence and power. Every member is encouraged to participate in group discussions and there is consensus over the important decisions. In an effective group, conflict is viewed as a positive aspect as all members are allowed to express their opinions and that conflict contributes to original ideas and decisions. When members feel that they are included,

accepted, and supported there tends to be a high level of cohesion in the group. In effective groups there is much problem-solving activity going on, as well as a focus on group functioning and goal accomplishment.

In contrast, in ineffective groups, members accept the goals imposed, which tend to be competitively structured (Johnson & Johnson, 2000). Communication tends to be 1-way, that is, while ideas are expressed feelings remain ignored. Membership participation is unequal and members who have leadership or authority dominate the group functioning. Position, rather than ability, determines who has influence and power in the group. Decisions are mostly made by the member or members who have the power in the group and there is little discussion on group procedures. Issues of conflict or controversy are ignored or suppressed. There is little emphasis on group cohesion and problem-solving adequacy is low. Furthermore, the member with the most authority evaluates the effectiveness of the group and decides how the group goals are to be accomplished.

According to Wheelan (1994), although all the factors that determine group productivity have not been discovered, certain factors are essential if the group is to be effective. First, the group goal must be clear to everyone in the group. In addition, members should be clear about their roles, they match member's abilities, and individuals accept their roles and status in the group. There is a collaborative climate when: (a) members feel encouraged to participate and share ideas and emotions, (b).the group spends time identifying problems and coming up with suitable solutions to implement, (c) there is an appropriate ratio of task and socio-emotional statements in the group, (d). the leadership style matches the group's level of development, (e) there is an equal distribution of labour and each member is responsible and accountable for doing the

work, (f) the group has access to resources necessary to accomplish the task, (g) there is a high level of cohesion and interpersonal attraction among members and (h) periods of conflict are frequent but brief and the group has strategies to deal with the conflict.

Levine and Moreland (2004) claim that in order for creativity in a group to be fostered certain activities must take place. First, group members must be motivated to share their ideas by feeling that their ideas are useful to the group. Second, members actually speak to one another and communicate their ideas. Third, members take the time to consider the ideas and there is general consensus as to which idea is the best. Finally, the idea is put into practice.

Problems Groups Encounter

Every group encounters problems from time to time, ranging from group members suddenly resigning to having difficulty solving problems. When groups have difficulty solving problems, even a small disagreement over procedures can become serious (Moreland & Levine, 1992). Being productive often depends on the group's ability to solve problems quickly and efficiently. As the theories of group development suggest, groups will inevitably experience some form of conflict, how they deal with it will determine if the group will evolve or remain stagnant. According to Moreland and Levine (1992) solving problems in a group is a complex process and it requires three distinct activities. First, group members must identify the problem that they are encountering. The group must state that the problem exists and then diagnose the nature of the problem. Second, the group must come up with solutions for their problem, that is, examine existing solutions and develop new ones. Finally, the group must evaluate the solutions, pick the appropriate one and implement it. If the group performs these three

activities properly they will become more productive; if they perform them poorly they will fail.

The types of problems that groups encounter vary. Some common complaints are apathy of group members, unequal division of labour, lack of expression of feelings, unequal input in decision making, etc. A problem is detected when group members notice symptoms and realize that something is not right. Although members may not be able to understand the nature of the problem, they do know that it exists. Once a problem has been detected group members may either try to solve the problem or ignore it. Members realize that the conditions in the group are not what they expected them to be. As the various theories of group development suggest, conflict arises when member expectations of what the group ought to be are different from what is actually going on in the group. This leads to the confrontation or storming (Tuckman term) phase. That is, a confrontation over work and personal issues may arise when members realize that the present state of affairs are less than satisfactory. The group may chose to ignore the problem until some triggering event (or precipitating event according to Worchel et al.) produces a threshold of arousal so that members acknowledge that the problem needs to be solved (Moreland & Levine, 1992). Some groups overlook problems completely, minimize their severity, or are slow in identifying problems. As time passes, these groups may have fewer alternative solutions to choose from and have more difficulty implementing solutions. In some cases, the group may not be able to solve the problem. On the other hand, some groups over exaggerate the problems that the group is experiencing. In this case, unnecessary time and energy are devoted to solving problems rather than devoting time to the task. Finally, many groups misidentify their problems.

When problems are misidentified, the group wastes valuable resources and time on unnecessary activities and fails to solve the real problem.

Low Productivity in Groups

A body of literature in educational psychology concentrates on the issue of low productivity in groups. Often working in small groups gives rise to negative effects such as the "free rider", the "sucker", the "ganging up", and the "status differential" effects (Salomon & Globerson, 1989). The "free rider" effect occurs when one student in the group does a minimal amount of work and expects the other more capable group members to do the work that is needed to complete the task. When the more capable students in the group feel that they are doing more than their share of the work they begin to feel resentful and thus the "sucker" effect emerges. Consequently, the harder working student who perceives that he or she is being taken advantage of by the other group members may decrease involvement in the group. The "ganging up on the task" effect pertains to some students going through the motions without actually working on the assigned task (e.g., pretending to be busy). Finally, some groups do not reach their learning potential because of the status differentials operating in the group. Students who are perceived as having high ability are also seen as having high status in the group. The high status student in the group gives and receives more help and information; thus, this student gains more social influence over the group. Students who have low status in the group have less influence over the group process (Salomon & Globerson, 1989).

One theory that is useful in illuminating the issue of productivity loss in groups is expectancy theory. The major premise of expectancy theory is that individuals can be expected to work toward an outcome if: (a) they value the behaviour or outcome (value);

(b) they perceive a connection between their behaviour and outcome (expectancy); and (c) if the cost to contribute is not too high (cost) (Shepperd, 1993). Low productivity in performance groups can occur for several reasons. First, individuals may perceive that there is no benefit in working hard because the end result (e.g., group product) is not important or because their hard work may not be noticed and rewarded. Second, individuals may feel that their efforts are not needed to achieve the group goal and therefore feel it is not necessary for them to contribute (e.g., free-rider). Third, individuals may perceive the physical or psychological costs of contributing (e.g., being taken for a sucker) to be too much. The theory proposes solutions in dealing with the issues of value, expectancy, and cost in performance groups. The first solution deals with low productivity by increasing the benefits of participating thus influencing the value of contributing to the group goal (i.e., provide incentives). The second solution is to increase the contingency between contributing and achieving the group goal, thus affecting the expectancy component of participating (i.e., make individual contributions indispensable). The third solution deals with low productivity by decreasing the costs of contributing.

Abrami, Poulsen, and Chambers (2004) applied expectancy theory to examine factors that may account for teacher resistance in implementing an educational innovation. Based on expectancy theory, a teaching strategy is more likely to be implemented if the perceived value of the method and the likelihood to success are high, and if the benefits outweigh the costs. While value and cost were important, they found that expectancy of success was a critical factor in differentiating educators who implemented cooperative learning in their classrooms from those that did not. That is,

teachers needed to believe that they had the skill to implement cooperative learning successfully and that the context was appropriate for cooperative learning.

Based on these findings, it can be speculated that student expectations of group success may explain students' willingness to participate in small group learning in classroom settings. If students do not see the benefits or value of working in groups, feel that they will not do well in that environment and feel their self-esteem will be affected then they will most likely be reluctant to work cooperatively with other students. Teachers will most likely have to deal with student resistance when implementing cooperative learning strategies in their classroom. A number of items of the SAGE attitude questionnaire address aspects of low contribution group behaviour.

Task, Maintenance, and Self-Oriented Behaviours

Drawing from the group dynamics literature, behaviours that occur in small groups typically fall into three categories: task-oriented behaviours, maintenance-oriented behaviours, and self-oriented behaviours (Beebe & Masterson, 1994; Taylor & Moghaddam, 1994; Pennington, 2002). The first category, task-oriented behaviours, consists of behaviours that are necessary to successfully complete a group goal. Task-oriented behaviours include setting goals, dividing tasks, asking for information and opinions, giving information and opinions, clarifying or elaborating, testing for consensus, asking about group progress, evaluating progress, and summarizing. Group task roles may include initiator-contributor, information and opinion seeker, information and opinion giver, elaborator, evaluator-critic, and energizer (Beebe & Masterson, 1994).

Maintenance-oriented behaviours include behaviours that assure individual comfort, set norms, and help individuals build emotional ties. Group maintenance-

oriented behaviours make group participation more enjoyable. These behaviours include harmonizing between others, gate-keeping (suggesting turns), encouraging, negotiating one's own position, norm setting and testing, and tension relieving (humour). Self-oriented behaviours are ones that disrupt or interfere with the successful completion of the work of the group. Self-oriented behaviours create chaos, make participation difficult, and set a negative emotional tone that make the group not only unpleasant, but ineffective as well (Border, 1997). These behaviours detract the group's focus from the task and intensify dysfunctional aspects of communication. Self-oriented behaviours include depending on others, resisting authority, withdrawing from group, pairing up in private relationships, putting others down, getting off the subject, verbal griping, non-verbal pouting, prolonged silence, triangulating, and dominating (sticking to own agenda) (Pennington, 2002).

The task, maintenance, and self-oriented behaviours defined in the group dynamics literature were used to guide the development of the observation scheme used in this research study. These behaviours were incorporated into the scheme in conjunction with the behaviours that other researches (i.e., Webb, 1996, 1991, 1989) determined were important in small group learning research.

Classroom Learning Environment

Extensive research over the past few decades on the sociopsychological environment or the classroom learning environment, as it is more recently referred to, has documented the importance of examining students' perceptions of their learning environments (Fraser, 1998; Fraser, Giddings, & McRobbie, 1992). Previous classroom environment research has investigated the relationships between students' cognitive and

affective learning outcomes and their perceptions of their classrooms (Quek, Wong, & Fraser, 2002). The field of learning environment research has provided a host of valid and widely applicable instruments for assessing students' perceptions of their classroom (Fraser, 1998).

The study of classroom learning environments emphasizes the student-mediating or student cognition paradigm (Waxman & Huang, 1997). According to this paradigm, students actively process information and interpret classroom reality. From this perspective, students are not considered passive recipients of instruction; rather classroom instruction and activities are influenced by student attitudes and perceptions. A major assumption is that there may be a mismatch between how students perceive their classroom and teachers' intent or observed classroom activities (Waxman & Huang, 1997). This implies that how the student experiences and views the classroom may be drastically different from they way the teacher intended the classroom instruction to be. Previous research has found that teachers tend to perceive the classroom environment more positively than do students in the same classroom (McRobbie & Fraser, 1993). On a small-scale, teachers have begun to use students' perceptions of their actual and preferred classroom environment as a basis to systematically attempt to improve classroom instruction (Majeed, Fraser, & Aldridge, 2001). Thus, the investigation of student perceptions has led to insights into the learning environment through the eyes of the participants, rather than through the eyes of an external observer (Aldridge, Fraser, & Huang, 1999).

Another major assumption is that how students perceive and react to their learning tasks may influence student outcomes. Previous research has shown that the quality of the

classroom environment in schools is a significant determinant of student learning (Dorman & Ferguson, 2004). That is, students learn better when they view the classroom environment in a positive light. Therefore, it is assumed that teaching and learning can be improved by taking student perceptions of the learning environment into consideration. Following this line of reasoning, this study will examine how students perceive the small group learning environment and how classroom instruction can be enhanced by highlighting potentially problematic areas of this approach of which teachers may not be aware. Both researchers and teachers have found it useful to use classroom climate measures as process criteria for evaluating the effectiveness of curriculum (McRobbie & Fraser, 1993). Furthermore, how student views and attitudes toward the small group learning environment are related to student achievement will be explored, since student perceptions (besides academic ability) have been shown to explain a significant amount of variance for both students' cognitive and affective outcomes (McRobbie & Fraser, 1993).

Over the past 30 years the work of Walberg and the work of Moos have figured predominately in classroom environment research. The most common methodological approach of their respective research has been to define classroom environment in terms of students' perceptions and use instruments that assess specific dimensions of the environment (e.g., student cohesiveness) (Dorman & Ferguson, 2004). The main question posed in classroom environment research is "What is it like to be in this classroom?"

In order to understand what is going on in the classroom from the student's perspective researchers have developed a host of measures that aim to capture a number of aspects that are important in the student's immediate environment. One measure that

has been widely used in classroom environment research is the Learning Environment Inventory (LEI) (Walberg, Anderson, & Fraser, 1982). The reasons for developing this instrument were threefold: (a) classroom observations are expensive and time consuming, therefore a paper-and-pencil measure of classroom interactions was needed; (b) classroom observations include low inference variables that have little bearing to student learning; and (c) students are the best judges of their own learning environment. The LEI is a 105-item measure assessing 15 factors: cohesiveness, diversity, formality, speed, material environment, friction, goal direction, favoritism, difficulty, apathy, democracy, cliqueness, satisfaction, disorganization, and competitiveness (Fraser et al., 1982).

Another instrument is the Classroom Environment Scale (CES) (Moos & Trickett, 1987), which is comprised of 90 items that measure students' and teachers' perceptions of their current classrooms. The CES is composed of 9 subscales that can be summarized into three dimensions: Relationship (involvement, affiliation, teacher support); Personal growth or Goal orientation (task orientation, competition); and System maintenance and Change (order and organization, rule clarity, teacher control, innovation). The CES taps dimensions that reflect the responsibility of the teacher to provide an environment in which students can learn and provides support for the students. In addition, the CES assesses student-student relationships. Although these instruments have been used in previous research there was a perceived need to create a new comprehensive attitude questionnaire that takes into account student perceptions.

Classroom Environment and the Development of the SAGE Instrument

Many studies that have examined student attitudes and perceptions have assessed the classroom learning environment or climate, and then used the responses from the

classroom climate instruments to predict students' cognitive, affective, and behavioural outcomes. However, few classroom environment measures are designed to examine the small group environment. The small group environment, which has an interactive element, is quite distinct from the whole class setting. This author believed that the key issues and concerns that many students expressed about working in groups were not being captured, and thus, solutions were not being sought. In order to solve the problems associated with cooperative endeavors one must be aware of the existence of the problems.

Through various experiences as a substitute teacher at a private high school and as a research assistant conducting classroom research on cooperative learning at the high school and CEGEP level it became clear that students often felt resentful when they were informed that they had to work with their fellow classmates. Common student complaints were that they did not get along with their group members (often for reasons that occurred outside of the classroom), they ended up doing most of the work, the work took longer to complete in a group than if they had worked on their own (others did not understand or too much socializing), or that their grades would suffer. These common themes occurred regardless of gender, grade level (from grade 7-11 students, as well as CEGEP students), or discipline (in English literature courses, as well as in math and sciences). Some students were adamant about not working with other students even if group grading was not involved.

Students had definite views of working cooperatively with others that were not being methodically explored and thus, were generally left ignored and unresolved. Some educators expressed the view that students are typically prone to complaining regardless

of the instructionally strategy used in the classroom, whereas some cooperative learning trainers felt that student complaints would diminish if cooperatively learning was implemented properly (positive interdependence and individual accountability were present). However, dismissing the views that students have toward their learning experiences may ultimately weaken the effectiveness of the cooperative learning approach. Literature searches failed to locate an instrument that addressed issues of small group learning from the viewpoint of the student. Consequently, the need to develop such an instrument emerged. A new measure was needed that examined specific aspects of the small group learning environment that existing classroom environment scales failed to capture. The new instrument was to add to the existing instruments by assessing new dimensions not previously addressed and by assessing dimensions that are characteristic of small group environments.

In the process of developing the SAGE questionnaire 12 classroom environment instruments were examined. In reviewing the literature, questionnaires were retrieved that assessed attitudes toward: (a) small group learning, cooperative learning, collaborative learning, and group projects; and (b) school and classroom learning, activities, life, climate, and environment. Fairly inclusive search criteria were used to insure that a collection of instruments were located that broadly represented student attitudes toward small group learning. In addition, instruments that assessed student attitudes toward learning in general were examined in order to explore the extent to which student attitudes are specific to the method of instruction used in the class (i.e., frontal teaching and small group instruction).

The following inventories were considered in the process of creating of the SAGE questionnaire: Learning Environment Inventory (Fraser, Anderson, & Walberg, 1982); Classroom Environment Scale (Moos & Trickett, 1987); Minnesota School Attitude Survey (Ahlgren, 1983); Classroom Life Instrument (Johnson, Johnson, & Anderson, 1983); Class Environment Checklist (Lazarowitz, Baird, Hertz-Lazarowitz, & Jenkins, 1985); College and University Classroom Environment Inventory (Fraser, Treagust, & Dennis, 1986); Classroom Attitudes Scale (Zahn, Kagan, & Widaman, 1986); Goal Orientation (Ames & Archer, 1988); Science Activity Questionnaire (Meece, Blumenfeld, & Hoyle, 1988); Group Climate Questionnaire (Hurley & Brooks, 1988); Gross Cohesiveness Scale (Johnson & Fortman, 1988); and untitled questionnaire (Gunderson & Johnson, 1980).

As might be expected there was considerable variability among the questionnaires in terms of scope, quality, and utility. Some of the instruments that were reviewed were developed by well-known researchers in the field, whereas other instruments were ones that were developed and used in small scale studies. Questionnaire length varied from 8 to 105 items. Some of the instruments were carefully designed and had good psychometric properties. For example, there is extensive evidence on the internal consistency and test-retest reliability of the LEI, which has been shown to predict student learning and that offers teachers convenient, reliable feedback about classroom climate from students' perspectives. For other measures no or little evidence of quality or utility was available. Among the instruments, the Classroom Life Instrument (CLI) appeared particularly well suited to assessing student attitudes toward small group learning and has been used in several studies for this purpose (Johnson et al., 1983).

As previously indicated, many of the classroom environment measures used in research were designed to capture the whole class setting, not the small group setting. For instance, some classroom climate instruments contained items that assessed the physical environment and had little bearing on small group learning. For example, "The students would be proud to show the classroom to a visitor" (LEI measure). Other instruments also had items that assessed aspects that were irrelevant to small group learning. For example, "The teacher is very strict" (CES measure) or "Spelling is one of my favorite things to study" (Classroom Attitudes Scale developed by Zahn et al., 1986). Given the number and apparent diversity of instruments, their variable quality, and uncertainties about whether and to what extent any existing instrument could be used to measure student attitudes, it was clear that a new measure was needed to examine student attitudes toward group learning. The final result was a collection of attitude statements collected from various sources that may or may not have tapped aspects of small group learning.

The initial item pool consisted of 575 items; 495 items from existing questionnaires and 80 items prepared from student comments. The student comments were gleaned from: (a) informal interviews conducted with high school and college level students; (b) observations of small group work in various classroom settings; and (c) structured questionnaires where students were asked to list positive and negative aspects of small group work. Each of the 575 items was placed by two coders into five major categories and 39 minor categories. The five major categories were: Student, Teacher, Self, Content, and Class/School. Some of the minor categories included: academic support, personal support, evaluation, task objectives/goals, academic and personal compatibility, academic and personal competence, and competition. After eliminating

redundant and obviously irrelevant items, 290 items were selected to be rated for relevancy to small group work. In order to insure the care with which the ratings were done and to reduce rater fatigue, the items were randomly divided into five questionnaires. The participants were asked to fill out only one of the questionnaires, which contained no more than 67 attitude statements. In order to get many perspectives on item relevancy to small group work, the statements were rated by three sets of judges: students ($N = 378$), teachers
($N = 55$), and cooperative learning trainers/consultants ($N = 122$). The cooperative learning trainers were listed in the staff development directory of the International Association for the Study of Cooperation in Education. All items were rated by each group of judges. The participants were instructed to rate each statement on a scale of 1 - 5, where 1 was *not at all relevant* and 5 was *extremely relevant*. Relevant items were ones that affected how students learned, how much students learned, or how much students enjoyed learning in groups.

The relevancy ratings of the 290 items were calculated for each group of judges. Correlations among item ratings were computed to determine the extent to which rater characteristics including gender, student ability, experience with group work, and liking of group work influenced judgements of relevancy. Items were selected from the highest rated categories with a maximum of two items per minor category, considering any meaningful differences attributable to rater characteristics. Furthermore, due to possible miscategorization, item rankings were examined in order to locate extremely relevant statements that were not captured by looking at the highest rated categories alone.

Forty-one items were selected to represent the highest rated categories and considered deviations among judging groups. The fact that more than half of the items (21 out of 41) that met the selection criteria came from statements expressed by students rather than from established measures, suggested that the existing inventories were inadequate for assessing the small group environment.

Evidence from the Master's research findings (Kouros & Abrami, 1995) indicated that existing instruments did not capture many key concerns that students had with learning in groups. For example, only one item came from the Learning Environment Inventory (LEI) developed by Walberg et al. (1982), nine items from the Classroom Life Instrument developed by Johnson et al. (1983), and one item from the Classroom Environment Scale developed by Moos and Trickett (1987). These existing measures may indeed be reliable and valid instruments, however, since some may not have been developed to specifically assess aspects of small group learning or others failed to capture key concerns of small group learning they may not be appropriate to use in cooperative learning research. Determining the usefulness of the SAGE instrument to assess dimensions of the small group environment and how student responses from this measure can be used to explore how students behave and learn in groups is a main goal of this study.

Summary

This chapter examined the literature related to attitudes, cooperative learning, group dynamics, group behaviours, and the classroom learning environment. In addition, details were provided for the steps involved in the development of the SAGE questionnaire. It is clear from the review of the literature that there are documented

academic and social benefits of working and learning cooperatively with others. Students learn more, like the content more, feel better about themselves as learners, and peer relations in the classroom improve. However, certain dynamics occur when individuals come together in order to achieve a group goal. Issues of unequal contribution, inability to express ideas and views, unequal power and leadership, unclear goals, and unresolved conflict may taint the cooperative process and lead to inefficiency and lack of productivity thus leading to unfulfilled group goals.

Student attitudes may play an important role in the cooperative process. Attitude theorists have pondered the importance of attitudes. That is, defining what attitudes are, how they are formed, how the change, as well as how they influence and predict behaviour. While the attitude-behaviour link may be difficult to demonstrate, there is an underlying assumption that attitudes influence how individuals feel, think, and behave. When individuals interact with others cooperatively they tend to exhibit behaviours that typically fall into three categories: task, maintenance, and self-oriented behaviours. While task-oriented behaviours are ones that are related to the task at hand, such as dividing the task, maintenance-oriented behaviours tend to have a social element that create a bond among the members. Self-oriented behaviours typically have a negative impact on the group, that is, a member may withdraw from the group functioning or create a negative climate in the group. The classroom climate or environment in which students work and learn has an impact on student outcomes. Student perceptions of or attitudes toward the classroom environment (specifically the small group environment) may influence how students behave and learn in the cooperative classroom. Thus, by examining student attitudes toward small groups via the SAGE questionnaire may lead to predictions of

student learning, as well as better implementations of cooperative group work in the classroom. See Appendix A for an overview of the key concepts of the literature review.

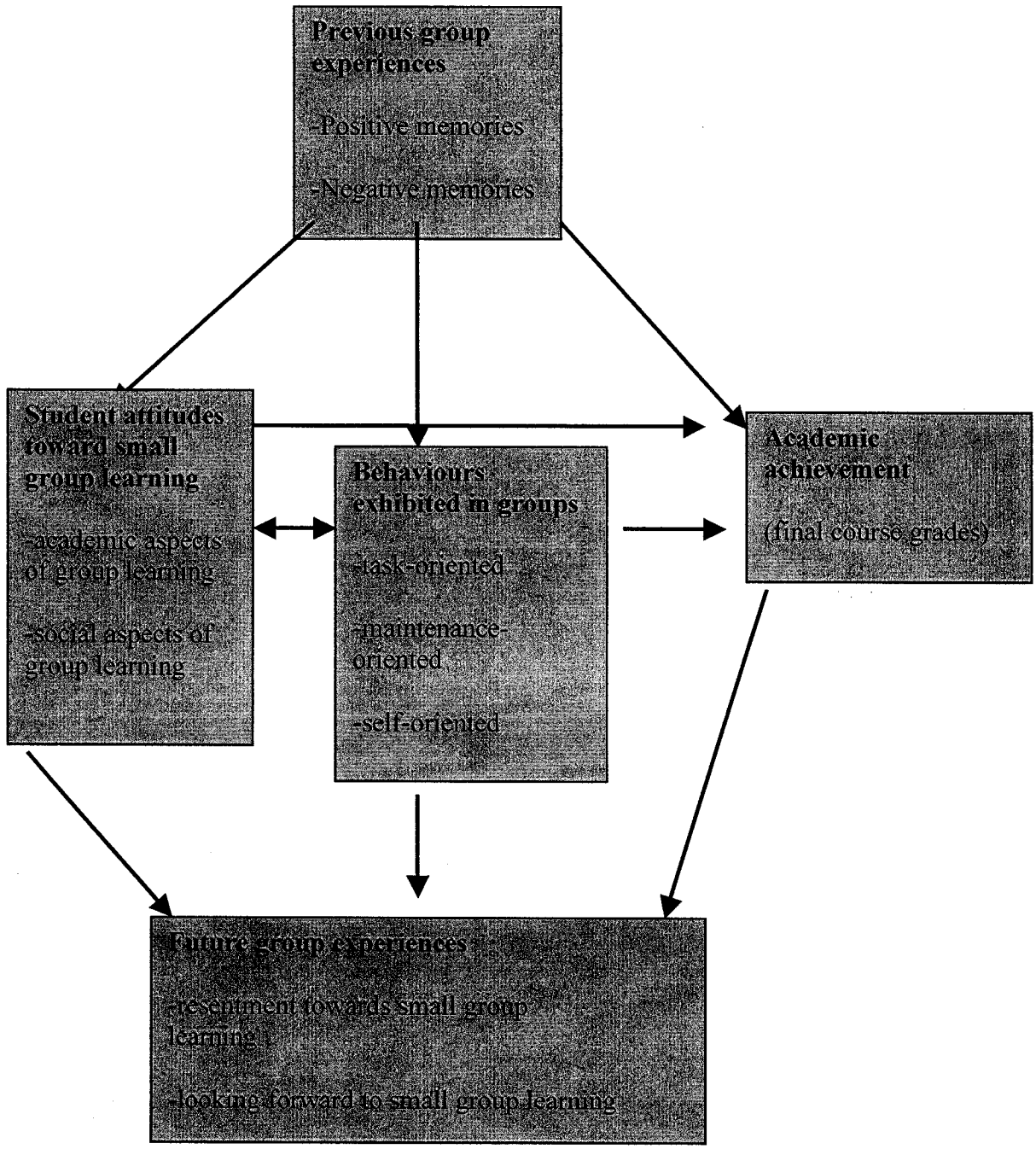
Summary of Research Problem

Many researchers state the need to further understand the underlying mechanisms and processes that operate in cooperative group work (Abrami et al., 1994; Mulryan, 1992; Springer et al., 1999). Webb and Palinscar (1996) state that although much research has been conducted on small group learning, group processes in the classroom still remain somewhat enigmatic. While previous research has documented that cooperative goal structures in the classroom promote greater achievement gains and more positive student attitudes toward school and classmates, little is known about how student attitudes toward small group work influence learning and performance. Therefore, it is imperative to have a better understanding of how attitudes toward small group learning influence behavioural and achievement outcomes.

The purpose of the present study is to investigate student attitudes toward specific areas of small group learning via the SAGE questionnaire. Previous findings from the Master's research indicated that the SAGE questionnaire assessed aspects of small group learning that were not captured by existing classroom climate questionnaires or previously addressed in the literature. For instance, aspects pertaining to control over group assignment were not previously examined. In turn, this phase of the study will investigate how student attitudes toward small group learning are related to group behaviours and academic achievement.

As the group dynamics literature suggests individuals entering a new group situation bring with them their past histories and group experiences (Napier & Gershenfeld, 2004). Past positive and especially negative group experiences may influence how students view the group goal and task, their group members, themselves, and cooperative group learning in general. The attitudes towards group learning that students possess may be related to the behaviours they exhibit in a group environment and to student achievement. In turn, how students think about group work, how they behave and how they achieve may influence their views of future cooperative activities. See concept map (Figure 1).

Figure 1. Concept map of relationships among attitudes, behaviours, and achievement in relation to past and future group experiences



Research Questions

Since the classroom environment has been determined to influence and explain student learning, it is interesting to ask whether responses to the SAGE questionnaire are related to student learning in small groups. The fundamental question of this research pertains to the utility and validity of the SAGE measure. Is the SAGE questionnaire a useful, reliable, and valid instrument that can be used in educational research?

Does the SAGE questionnaire serve as a diagnostic measure in which new insights are provided as to how students perceive the cooperative group environment? What aspects of small group learning elicit strong positive and negative attitudes from the participants? It is hypothesized that issues of unequal participation and feelings of being taken advantage of by other group members will elicit strong negative student attitudes (Salomon & Globerson, 1989). And thus, issues of group evaluation will also evoke strong negative attitudes towards group learning. McManus and Gettinger (1996) found that grade 3 students rated the academic benefits of cooperation highly, however, social aspects of working in groups may be more important to students in high school and college settings. It is also hypothesized that female students (although typically viewed as being more cooperative than males) may have less positive attitudes towards group learning than male students. Thomas-Hunt and Philips (2004) findings suggest that in general, when women work in groups they are perceived by others as less expert than men, are less influential, and feel less confident about their impact on the group. They also conclude that men have a greater impact on group interactions than do women, and that possessing expertise can be a liability for women.

Of utmost importance in questionnaire development are the measurement characteristics of the instrument, because an instrument that is not reliable or valid is of no use to either researchers or educators. The reliability of an instrument deals with the issue of accuracy and generalizability, while the validity of the instrument is concerned with the extent to which it measures what it purports to measure (Sax, 2004). What are the psychometric properties of the SAGE measure in terms of Cronbach's *alpha* reliability for the total instrument and for the individual factors of the measure? Are student responses stable over time (test-retest reliability)? Do student attitudes toward working in groups become more positive or negative over time? Based on the meta-analysis of Springer et al. (1999) that the more time spent in groups the more positive attitudes, it is hypothesized that student attitudes will become more positive over time (time 2).

Can the criterion-related validity of the SAGE measure (specifically predictive validity) be established? That is, can responses from the SAGE questionnaire be used to predict academic achievement? Is there a relationship between student attitudes on the SAGE instrument and student course grades?

Can an underlying factor structure be determined from the SAGE items? That is, do the items cluster together on specific factors and thus provide composite scores that can then be used to predict student achievement? What relationship exists between student attitudes on the SAGE questionnaire and student behaviours exhibited during group work? Finally, do student attitudes or group behaviours predict student achievement (based on final course grade)?

RESEARCH METHODOLOGY

The Present Studies: Pilot Study

Purpose

The purpose of the pilot study was to examine the factor structure of the newly developed SAGE questionnaire and to refine the instrument. The goal was to administer the 41-item Likert scale: (a) to a large number of students who had experienced small group learning in various degrees; (b) in various classrooms, grade levels, and content areas; and (c) in various educational and geographical settings.

Participants

Three subject pools were used for this phase: (a) over 2000 North American high school students from Montreal, Ontario, Winnipeg, in Canada, and Massachusetts and New Jersey in the United States; (b) 17 adult education students from a university in Montreal, Canada; and (c) 101 grade 10 students from a public high school in Montreal, Canada. In order to have access to over 2000 participants, cooperative learning trainers listed in the staff development directory of the International Association for the Study of Cooperation in Education who were also teachers were contacted in order to participate in this study. Data collection took place in the fall of 1996 and spring 1997.

Procedures for Administering the SAGE Measure

Subject pool A:

Principals and teachers who were listed in a cooperative learning directory were contacted in order to be part of this study (see Appendix B). Due to practical and geographical considerations the teachers themselves administered the SAGE measure (version 1) (see Appendix C). Principals or contact teachers were mailed: (a) parental

consent forms (see Appendix D); (b) SAGE questionnaires; (c) computer answer sheets; (d) instructions for administering the questionnaire (see Appendix E); and (e) reflection forms so that students could comment about the questionnaire (e.g., items they found confusing) (see Appendix F). Completed answer sheets were mailed back, however parental consent forms were deemed unnecessary by principals.

Subject pool B:

Adult education students who were predominantly teachers enrolled in a cooperative learning course were asked to respond to the questionnaire during class. This investigator who was also the teaching assistant for the course administered the instrument.

Subject pool C:

A teacher who taught computer science to grade 10 students administered the questionnaire in his classroom. Parental consent was not requested, however he did have the principal's consent.

Procedures for Examining Scale Structure

Student responses were subjected to exploratory factor analysis (principal components analysis with varimax rotation) in order to determine the underlying structure of student attitudes (i.e., number and nature of the factors). The results indicated that this version of the SAGE questionnaire was comprised of 7 factors: Support, Work Overload*, Desiring Compatibility, Accepting Diversity, Valuing Cooperation, Involvement, and Nonsupportive Interaction*. Factors with an asterisk (*) were negatively phrased: higher scores indicated less favourable attitudes toward learning in small groups. (See Appendix G for the factor definitions). Although the 7 factors

explained 47.9% of the total variance the item loadings did not always make conceptual sense (i.e., items that logically should have loaded on the same factor did not).

Based on the results from this phase, the SAGE questionnaire was revised in terms of item selection, item wording, instructions to respondents, etc. Some items were reworded for example "When I work in a group in this class the work is more fun" to "The material is more interesting when I work with other students". Some items were deleted such as "When I work in a group in this class I can talk to my group members". Finally new items were created by examining student comments generated from the positive/negative form (data from Master's research). For example, "My marks improve when I work with other students". The SAGE instrument consisting of 54 items and three background questions (gender, grade level, subject matter) was administered to 17 adult-education university level students and 101 high school students from Montreal, Quebec. Some interesting highlights were: 81% of the students felt that their group members helped explain things that they did not understand; 86% of the students wanted to work with friends; and less than 10% agreed with the statement "My marks improve when I work with other students". Due to the low sample size factor analysis was not performed again.

The SAGE was then refined further by placing the response scale directly on the questionnaire and two more background questions were added (grade you expect this year and grade you received last year). Based on the preliminary results of the previous versions of the SAGE questionnaire, the SAGE measure (final version) now consisted of 54 attitude items and five background questions (See Appendix H).

The goal of the present study was to capture student attitudes via the SAGE questionnaire from a large population and from a number of classroom settings where: (a) students were exposed to various modes of small group learning; (b) students were from various grade levels; (c) students were learning various types of subject matter; (d) students had exposure to various lengths of time doing group work (i.e., one class session or one course semester); and (e) there was some variability in group membership (i.e., changed constantly or remained the same during the course of group work). By sampling diverse student populations and classroom settings a large amount of data were accumulated that realistically captured what was occurring in the school system.

Present Study

Purpose

The purpose of this study was threefold: (a) to examine the properties of the SAGE questionnaire in terms of factor structure, reliability, and validity by administering it in various classroom settings; (b) to investigate if student attitudes toward working in small groups were related to group behaviours as recorded on an observation scheme via time-sampling; and (c) to examine if student attitudes toward group learning and group behaviours were related to academic achievement (i.e., student final course grades). See Table 1 for an overview of this study.

Table 1

Overview of Data Collected in this Study

School	SAGE Time 1	SAGE Time 2	Observation Data	Time frame	Student Grades	Administer of SAGE questionnaire
1 CEGEP	*N*= 51	*N*= 28	*N*= 47	6 weeks	Yes	Researcher
2 High School	*N*= 17	*N*= 16	No	6 weeks	No	Teacher
3 High School	*N*= 98	*N*= 83	No	6 weeks	No	Teacher
4 CEGEP	*N*= 77	*N*= 59	*N*= 66	13 weeks	Yes	Researcher
5 High School	*N*= 199	*N*= 176	*N*=41	12 weeks	No	Teacher
6 High School	*N*= 646	*N*= 348	No	6 weeks	No	Researcher

Site and Participants

Six subject pools were used for this phase: (1) 51 students (30 males and 21 females) enrolled in two biology classes at a junior college (CEGEP) in Montreal, Quebec, Canada; (2) 17 grade 7 high school students (7 males and 10 females) from Shawbridge, Quebec, Canada; (3) 98 grade 7 and grade 8 high school students (41 males and 57 females) from Hull, Quebec, Canada; (4) 77 students (26 males and 51 females) enrolled in two biology classes at a junior college (CEGEP) in Montreal, Quebec, Canada; (5) 199 high school students (grades 7-11) (88 males and 111 females) from a public high school in Montreal, Quebec, Canada; and (6) 646 high school students (336 males and 310 females) ranging from grades 7-11 from a public high school from

Montreal, Quebec, Canada. School board directors from three English-speaking School Boards were contacted in order for their teachers and students to participate in this research. In addition, an English-speaking public CEGEP was also contacted to participate. In all four cases, a short research proposal was submitted to the review committees who were in charge of all the research activities conducted at their institutions. At one school board, an oral presentation of the study was also required. Based on discussions with school board officials and with the teachers who volunteered to participate in this study, students (high school and CEGEP) had varying degrees of experience with small group learning, ranging from structured (i.e., accountability and interdependence were present) to loosely structured group work (i.e., students are simply asked to work together).

Procedures for Administering the SAGE Questionnaire

CEGEP subject pool (school 1 and 4).

Male and female students that were racially and culturally diverse enrolled in 2 biology classes were administered the SAGE questionnaire twice (6 weeks apart) in the spring of 2000. In the fall of 2000 students enrolled in a biology and a cell biology course were administered the SAGE measure twice (13 weeks apart). Each course was divided into two lab sessions (e.g., one in the morning and one in the afternoon), therefore students from four labs participated in the spring semester and four labs in the fall semester (eight total).

Prior to the data collection a proposal of the study was submitted to the CEGEP in the winter of 1999 and approval to conduct the research was granted. (Note: The Ethics Review Board at the author's university had also approved this research study, see

Appendix I). An experienced instructor who had considerable knowledge with the subject matter and with small group learning gave consent for attitude and observational data to be collected in her labs. In addition, access to final course grades was permitted by the research review committee of the institution. Student consent was requested prior to the data collection (see Appendix J), a total of six students opted not to participate in the study. The SAGE questionnaire was administered on-site by this researcher.

High School subject pool (school 2 and 3).

Grade seven and eight students (total of 115 from the two high schools) were administered the SAGE questionnaire in the Spring of 2000 and again 6 weeks later. The students differed in terms of subject matter taught in the classroom and experience with group learning. Permission to collect data on these students was granted from the Director of the School Board. The principals were sent a letter informing them of the study and respondent consent was requested. Due to the fact that these two schools were outside the region of Montreal, the teachers administered the SAGE questionnaire themselves in their classrooms. The principals returned the signed parental consent forms and completed SAGE questionnaires.

High School subject pool (school 5).

Students from grades 7-11 from various classes and various experiences with small group learning were administered the SAGE questionnaire in the December 2000 and again 15 weeks later in April 2001. Approval to conduct the study was granted by the school board, the governing board of the school, the principal, and the teachers. The principal was mailed: (a) parental consent forms; (b) SAGE questionnaires; (c) instructions to principal; and (d) teacher envelopes containing instructions for

administering the questionnaire, as well as student ID codes. The teachers administered the questionnaires themselves in their classrooms.

High School subject pool (school 6).

Students completed the SAGE questionnaire in late March and again in early May 2001. In order to sample all of the students from this secondary school the students filled out the SAGE questionnaire while they were in their classrooms learning French. This researcher and a research assistant were on-site to administer the questionnaire. Students that stated that they did not experience group work in that particular classroom were instructed to respond to the attitude items while reflecting on their most recent group experiences. Approval to conduct the study was granted by the school board, the governing board of the school, the principal, and the teachers.

Observational Component of the Study

Real time observations of small group work were conducted during three semesters at two school sites via time-sampling. Observations were conducted: (a) on 47 CEGEP students during a period of six weeks in two biology classrooms (total four labs) during Spring 2000 (school 1); (b) on 66 CEGEP students during a period of 13 weeks in two biology classrooms (total four labs) during Fall 2000 (school 4); and (c) on 41 high school students in three grade 11 Economics classrooms during Winter 2001 (school 5). For reliability purposes two observers were needed: the author of this study and a research assistant.

Training and Reliability

Prior to conducting observations at the CEGEP and high school, observers received considerable training on how to accurately use the observation scheme. That is,

behaviours to be observed were operationally defined and both observers came up with examples of the behaviours so that there was similar understanding and interpretation of the behaviours. Specially, each observer explained what she considered the behaviour to constitute and what the behaviour did not. For example, there was considerable discussion as to what would be categorized as a simple exchange of information (giving information) as opposed to giving a detailed explanation (giving elaboration). Also, how the giving information category was different from the giving information about group procedures category (the former category pertains to the task while the latter category pertains to interactions about the group functioning).

Furthermore, videotapes of students working in biology labs (i.e., similar set-up and content as in this study) were reviewed and trial observations were conducted using the tapes. The benefits of using videotapes for observational training were: (a) this allowed for the observers to become accustomed to the fast pace of recording the behaviours on the observation scheme; (b) the observers learned to focus on only one targeted student at a time; and (c) areas of disagreement could easily be resolved by rewinding the tape and discussing why the behaviours were categorized and recorded in a certain manner.

One week of pilot observational data were collected (school 1 and 4) before actual observations were conducted in order to make revisions to the scheme if necessary and to establish interrater reliability. Only one amendment was made to the observation scheme. It was felt that jovial teasing between group members frequently occurred but was camouflaged under the off-task category. Ultimately, not only would the off-task category be over inflated (which is typically viewed as being counter-productive to group

learning), but also the positive social aspects of camaraderie among group members would be lost.

During the pilot week, observers used the opportunity to familiarize themselves with the setting, the students, and especially data collection procedures. While the videotapes were useful during the training phase, the observers needed to be aware of the real conditions that were present in the actual labs. For example, observers needed to train themselves to focus on targeted students and tune out all background noises and activities that typically occur in a cooperative classroom environment. Furthermore, the observers needed to be aware that there may be interruptions when the teacher, teaching assistant, or other group members come over and interacted with the observed group members. Finally, the experiences during the pilot week made the observers aware of the need to consider practical considerations. That is, to be prepared with extra batteries, working earphones, etc. Unlike videocassettes, real time observations cannot be paused or rewound and therefore valuable information can potentially be lost if observers are faced with technical difficulties. Cohen's *kappa* reliability for the pilot data was .70. Data collected during the pilot week were not incorporated in the final analyses.

Interrater Reliability

In order to establish interrater reliability two steps were undertaken: (1) an agreement matrix was developed; and (2) Cohen's *kappa* reliability coefficients were computed. Since a large number of observations were conducted in this study (especially at school 4) interrater reliability was conducted on 20% of the data that is the norm in observational studies. First, an agreement matrix was composed for each observed group (see Appendix K). Typically, each group consisted of 4-member groups and each group

activity did not exceed 20 minutes. The agreement matrix listed the behaviours on top and on the left side of the matrix. Tallies on the diagonal indicated agreement between the two observers, whereas tallies off the diagonal pinpointed disagreement (Bakeman & Gottman, 1997).

This procedure was useful in highlighting areas of disagreement between observers. In this study, most of the disagreements were not due to miscategorized behaviours (i.e., one observer coded a behaviour as reading text while the other observer coded it as on-task) but rather reliability was lowered due to missing data. That is, one observer coded an interaction while the other one missed it due to how she was seated in relation to the group or excessive talking in the classroom made it difficult to hear what the targeted student was saying.

The next step was to determine Cohen's *kappa* reliability coefficients for each of the observed groups (20% of the data). Cohen's *kappa* is an agreement statistic that corrects for chance agreement and is preferred over simple agreement percentages (Bakeman & Gottman, 1997). The formula takes into account the proportion of agreement actually observed (as indicated from the agreement matrices) as well as the proportion expected by chance. Typically, since the amount of agreement is corrected for chance Cohen *kappa* coefficients are by nature lower than simple agreement percentages. As a rule of thumb, *kappas* of 0.60 to 0.75 are characterized as being good and over 0.75 as excellent (Bakeman & Gottman, 1997). In this study, the value of *kappa* for the observation visits ranged from 0.70 to 0.88.

Observing Group Behaviours via Time-Sampling

While there are many approaches to conducting observations in the classroom this project used the time-sampling method incorporating a structured observation scheme. In choosing a recording procedure several issues must be taken into consideration including: the purpose of the assessment, what is being assessed, amount of detail needed, and practical considerations (Bentzen, 2000). The time-sampling procedure attends to the occurrence or non-occurrence of selected behaviours within specific, equal time frames. In time-sampling, the observer watches and records selected behaviours during preset uniform time periods and at selected intervals. For example, observer records student A for one minute using an observation scheme, then moves on to child B for one minute, etc., until the group members cease interacting. Behaviours that occur outside of these time periods are not recorded. Some of the advantages of time sampling include: (a) no restrictions on the kinds of behaviours that can be studied; (b) economical in terms of time and energy; (c) representative and reliable data; and (d) large numbers of recordings can be collected (Good & Brophy, 2003). However, some disadvantages of the method that must be taken into consideration are: (a) does not capture details of the context; (b) behaviours have to occur frequently (e.g., once every 15 minutes); (c) does not treat behaviour as it naturally occurs; and (d) use of predetermined categories might bias what the observer sees (i.e., look for things that fit categories) (Good & Brophy, 2003). With this approach the observer must determine what behaviours are to be observed, when they are to be observed, and for how long they are to be observed to obtain a sample set of behaviours typical of the students in question.

The observation scheme that was employed in this study was also designed to capture selected behaviours that frequently occur during group work at 10 second intervals. Time sampling has been recently used in order to conduct small group work observations in actual classrooms. Gillies (2002, 1999) and Gillies and Ashman (1998) used time sampling to record the occurrence of behaviour within each category at 10 second intervals for group members over a period of 10 minutes.

Observation Scheme

Based on the group dynamics literature (Beebe & Masterson, 1994; Taylor & Moghaddam, 1994) and the observational research conducted in cooperative learning settings (Kouros et al., 1993; Poulsen et al., 1993; Webb, 1991, 1989; Webb & Farivar, 1993; Webb & Mastergeorge, 2003) as well as the pilot data, the following 18 behaviours were selected for observation during cooperative group work: Task behaviours: asks for help (QS), is asked for help (QT), gives information (GI), receives information (RI), gives elaboration (details of how to solve the problem) (GE), receives elaboration (RE), checking understanding (CH), group procedure information (GP), progress and evaluation (EV), actively listening (LI), on-task (non-verbal) (ON), and reading text (RD). Maintenance or social behaviours: harmonizing (HA), encouraging (EN), and joking (JK). Self-oriented behaviours: off-task (verbal and non-verbal) (OF), putdowns (PD), and withdrawing (WD). (For the operational definitions see Appendix L, for the observation scheme see Appendix M).

The observation scheme was developed to capture the selected behaviours at 10 second intervals. That is, every 10 seconds the observers observed a targeted student and recorded on the scheme the behaviours that the student engaged in. For example, if

student 1 was reading his lab manual and then he gave a short answer and then wrote it on his worksheet, the behaviours were recorded as RD (reading text), GI (giving information), ON (on-task). After 10 seconds passed the observers focused on the next target group member and recorded the behaviours that the student engaged in. Ten second intervals were chosen because based on previous research of others Gillies (2002, 1999) and Gillies and Ashman (1998) and previous experience (e.g., Kouros et al., 1993) that this interval length is long enough to capture the target student's behaviours and short enough to capture what the next target student is doing (e.g., providing an answer). Furthermore, in the Kouros et al. study inter rater reliability was increased when a 10 second interval was adopted over a 15 second interval used during the pilot study. A portable walkman with two sets of headphones was used to inform the observer that the 10 seconds had elapsed. Initially during the pilot week each observer had her own walkman, however since one observer was listening to an original tape listing a sequence of numbers and the other observer was listening to a copy there was concern that the recording was not in sync. That is, one observer was a fraction of a second lagging behind the other.

While the scheme is designed to capture student interactions, teacher-student interactions as well as non-member interactions were not recorded. The observers entered a dash (---) on the observation scheme if: (a) the teacher interacted with the group members; (b) a nongroup member interacted with the students; and (c) the observer became distracted and missed the interactions during the 10 second interval.

Observation Procedures

In this study observations were conducted while students learned in groups in their regular classroom setting. Prior to the observations, it was explained to the teachers that the role of the observers was to record group interactions and not to evaluate them in any way in terms of teacher adequacy or skill with cooperative group work. Teachers were encouraged to follow their typical classroom routines and not modify their procedures and activities because observers were in their classroom. This was done to ensure that the recorded group behaviours and interactions were ones that would occur in a typical classroom environment and to decrease any sense of apprehension or imposition that the teachers may have felt. Furthermore, there was no manipulation on the part of the researcher of this study as to how teachers assigned students to groups, how much time was devoted to group work, etc.

As stated previously, observations were conducted at a CEGEP and at a public high school. The high school class periods were 45 minutes long, while the CEGEP lab sessions were three hours long, therefore the amount of time devoted to group learning was longer in the CEGEP setting and more observational data were collected. Also, depending on the material covered, type of task, and other classroom considerations (e.g., teacher talking about non-academic matters), the amount of time students worked in groups in each classroom setting varied during each observation visit.

CEGEP location (school 1and 4).

Observations at this site were conducted during two semesters in four biology classrooms (four labs in Spring 2000 and four labs in Fall 2000). Observations in Spring 2000 were conducted over a period of six weeks (middle until the end of the semester)

and observations conducted in Fall 2000 started from the beginning of the semester until the end of the course (13 week period). Observations conducted at this site will be discussed simultaneously because the four courses were taught by the same instructor and the observation procedures followed were similar. This particular instructor had considerable knowledge and experience with the content as well as having experience with conducting research in cooperative learning. While the instructor was familiar with the various cooperative learning methods, she did not adhere to any particular strategy (e.g., STAD, TGT), but rather relied on her own interpretation of cooperative group work. She tried to make sure that each group member was accountable for doing the work and that there was interdependence among the members (i.e., one student in the group was responsible for making accurate measurements using the spectrophotometer).

The instructor did not have any reservations about allowing observations to be conducted in her classroom or providing access to final course grades. Furthermore, she made every attempt to facilitate the observation process. For example, when two students in one lab opted to not participate in this study the instructor changed the composition of the groups so that those two students were placed in the same group. Therefore, only one group out of the six was not observed thus ensuring that data was collected on the maximum amount of students in that particular lab.

On the first observation visit the biology instructor introduced the observers and the fact that they would be observed as they worked at their lab stations. The students were informed by the author that they were participating in a doctoral dissertation study and that attitudinal, behavioural, and achievement data would be collected. They were also informed that they had the option to not participate, that their results would be kept

confidential and that individual responses would not be reported. Students were also informed that while they could see the observation scheme after the study was completed, they would not know which behaviours were being coded for so that they would not intentionally alter the group interactions.

The instructor preferred student-initiated group assignment. During the first day of class the instructor made it a point for students to pair up and introduce themselves and then report back to the whole class what they have learned about their partner. Usually students chose their initial partners to be part of their 4-5 member teams. The instructor only changed the composition of the group if she foresaw that particular students would not work well together or if they were prone to be off-task.

During both semesters of data collection, the 3-hour labs followed the same consistent format. In the first hour the teacher presented new material and information as well as reviewed group lab tests and concepts from the previous lab. In the remaining two hours, students completed the lab activities as a group at the various lab stations around the laboratory. Typically, there were 6-7 stations to complete and groups were informed which lab station would be observed. The observers were seated at a designated lab station and groups took turns completing their observed group activity. The instructor informed the groups when it was their time to be observed at the lab station. For example, one group activity on osmosis consisted of each student setting up a slide of a plant tissue on a microscope (10 minutes) and then observing and explaining to the other group members what they observed and why (10 minutes). This activity allowed each person in the team of four to set up one small experiment and to learn from all four experiments in a shorter time than if each person did all four. Students were expected to compare notes

on what they did so that everyone in the group knew the procedures and the results of the staining that was done. The group activities were designed to be completed in fewer than 20 minutes. The observations of groups were counterbalanced over sessions so that no one group was always observed first or last.

As stated previously, the observers recorded the student behaviours as they interacted with their group members. Multiple codes for a given behaviour were not permitted (e.g., GI/GE, giving information/elaboration). Every 10 seconds the observers focused on a different group member, each behaviour that occurred during that interval was mentally categorized, coded and entered on the observation scheme. When the observers heard on the accompanying audio-cassette the number "1" they began entering data for the first group member. When 10 seconds had gone by the observers heard the number "2" which indicated that it was time to go on to the next line and begin recording data for the next student. This procedure was followed until the group activity was completed. Typically, 5 to 6 groups were observed each in the morning lab and the afternoon lab. However, due to the nature of some tasks on some sessions only 2 - 3 groups were observed. For example, in one lab where groups were supposed to make cheese the time it took for the culture to ferment before the members were able to continue their group activity decreased the number of groups that were observed that day. While most groups remained intact during the observation visits there were times when the group composition changed, when students were absent, or students from the afternoon lab attended the morning lab. Overall, most groups were observed on average four times during Spring 2000 and on average seven times during Fall 2000.

High School location (school 5).

Observations were also conducted at a high school setting during Winter 2001 in three grade 11 Economics classrooms. The observations were conducted during four full day visits during the months of February and March. The instructor volunteered during a staff meeting to allow for observers to come into her classroom and observe group work. Since the teacher was relatively young, she did not have any reservations about having researchers in the classroom because she and the students were used to having her teaching skills observed. The teacher frequently used group work in her classroom and had students work on group projects. While she did not adhere to any particular cooperative learning strategy, she tried to make sure that each member was responsible for participating in the group activity. She viewed her role as a facilitator when students worked in groups. That is, she circulated around the room to make sure that students were on task, provided information and clarification when the group members were unsure of the task or their roles or when she saw that a particular student was not participating. On one particular occasion she spent considerable time with a pair of students that did not hand in their group project. She allowed the students to air out their frustrations with each other, and dealt with their lack of communication and unmet expectations so that the negative group experience would not be repeated in the future.

Since the duration of the course period was 45 minutes, only one group was observed per period. The groups to be observed were randomly selected by the observers. Unlike the CEGEP setting where a large number of groups were able to be observed at a particular session, there were significantly less observational data collected at the high school setting. In total, observational data were collected on 17 groups. The composition

of the groups did not remain consistent over the course of four weeks. The students either worked in pairs or in 3 - 4 member groups depending on the activity. During the course of the observation session students worked on three different projects: stock market competition, budget report, and advertising project. While students were instructed for all three projects to work cooperatively and to actively and equally participate there were no specific structures inherent in the task that enforced individual accountability and positive interdependence.

The procedures for conducting observations were identical to the observations conducted at schools 1 and 4, however unlike the CEGEP setting, the observations took place in classrooms and not laboratories. Initially, the desks were arranged in rows and when the teacher told them to begin their group activity students placed their desks next to each other. Typically, the teacher took 10-15 minutes to go over the group activity or to deal with other classroom information that students needed to know (e.g., upcoming test dates). Once the students were ready to begin their group activity, the observers sat next to the group and began recording behaviours on the observation scheme. The observation scheme did not need to be modified to meet the needs of the high school setting, that is there were no new behaviours exhibited that were specific to this population. Each student was observed for 10-second intervals for a total of 20 minutes. The last 10 minutes in the period were usually spent on other activities (i.e., organizing other work or socializing with other students).

Student Achievement Grades

While access to student grades for all the participants in this study was requested when asking permission to conduct research, access was granted only for the CEGEP

students ($N = 122$) in the biology labs. In this study, the final course grade for the biology classes was used for achievement data. The final grade was a compilation mark of: (a) five lab quizzes (total 20% of final grade); (b) two lab exams (10% each); (c) two unit tests (15% each); and (d) final exam (30%). Each lab quiz had four sections; each consisting of four multiple choice and two true-false questions. The lab quizzes were performed as a group and a group grade was assigned. Each lab exam consisted of 60 questions: a combination of true-false, short answer, and multiple choice questions. Each unit test was worth 30 points or 15 % of the final grade and consisted of parts: (1) 40 multiple choice questions (worth 20 points); (2) eight true-false questions (two points); (3) two matching columns questions (six points); (4) label the diagram (two points); and (5) construct a concept map with at least ten major ideas (two bonus points). The final exam consisted of 90 multiple choice questions, in addition to three bonus questions. The same final exam was used by two instructors to assess content acquisition. In this study, teacher-made tests were used as opposed to standardized achievement tests, therefore, the psychometric information on the achievement data are not available. However, in order to examine the content validity of the biology achievement measures, a biology instructor who has over 20 years of experience with the course content at the college level, was asked to evaluate the quality of the tests. The achievement tests were deemed to be appropriate and valid measures based on the following criteria: (a) covered content; (b) quality of questions; (c) difficulty of questions; (d) percentage of questions at recall level; and (e) percentage of questions at higher level. See Appendix N for the expert ratings for the final exam, unit tests, and lab tests.

Summary

This chapter described the methodology used in this study, including the pilot study. Details were provided concerning the purpose, sites, and participants (six subject pools), and the procedures for administering the SAGE questionnaire. In addition to attitudinal data, observational data were also collected in this investigation. The information pertaining to the observational component of the study, included: training and reliability, conducting observations via time sampling, the observation scheme, and the observation procedures executed at the three observation settings (CEGEP biology labs and grade-11 Economics classrooms).

RESULTS

Data Screening

From a total sample of 1088 students (who completed the SAGE questionnaire), 22 respondents were eliminated. Ten of the respondents were eliminated from the data set because they had more than 10% missing data on the 54 attitude items. Data from 12 students were not included because of noticeably unreliable responding. Among the remaining 1066 respondents, missing data on the 54 attitude items were replaced by the respondent's own mean for these items. In order to facilitate analysis 23 negatively phrased items were reverse coded (items 2, 4, 5, 6, 11, 15, 18, 20, 21, 24, 26, 27, 28, 30, 32, 33, 39, 43, 44, 46, 50, 53, and 54). Descriptive statistics revealed that although some means were high (e.g., $M = 4.36$) there was a good range in the variability of responses (range *SD*s: 0.76 to 1.27).

Sample and Setting Descriptions

Of the 1066 students that responded to the SAGE questionnaire the first time, 938 were high school students while the remaining 128 students were college level. Fifty-two percent of the total set of respondents were female ($N = 553$). Sixty-nine percent of the high school students filled out the questionnaire while they were in their class learning languages (English or French). The high school students were almost evenly distributed according to grade level, with the majority of respondents being grade 10 students (24.2%). Finally, 58% of the students (college and high school level) reported that they received a final grade of 80 or over. Fifty-six percent of the students reported that they expected a final grade of 80 or over this year.

Statistical Analysis

In order to answer the research questions in this study the following analyses were performed: descriptive statistics, exploratory factor analysis, Cronbach *alpha* reliability, hierarchical multiple regression, Pearson Product Moment Correlations, independent and dependent *t*-tests.

Descriptive SAGE Questionnaire Data

The means and standard deviations for the SAGE questionnaire items are listed in Table 2. The frequency data for the SAGE questionnaire (agree and strongly agree responses combined, disagree and strongly disagree responses combined, and undecided) are listed in Table 3.

Table 2

Student Attitudes toward Group Environments Questionnaire (SAGE):

Means and Standard Deviations

Item	Item Stem	*M*	*SD*
1	When I work in a group I do better quality work.	3.36	1.06
2	When I work in a group I end up doing most of the work. *(*I do not end up doing most of the work*)	3.13	1.07
3	When I work with other students I am able to work at my own pace.	3.06	1.10
4	When I work in a group I want to be with my friends. *(*When I work in a group I do not want to be with my friends*)	1.63	.86
5	The work takes longer to complete when I work with other students. *(*The work does not take longer to complete when I work with other students*)	3.14	1.17
6	My group members do not respect my opinions. *(*My group members respect my opinions*)	3.89	.89
7	I enjoy the material more when I work with other students.	3.64	1.01
8	My group members help explain things that I do not understand.	3.84	.94
9	I become friends with my group members.	3.52	.96
10	When I work in a group I am able to share my ideas.	3.91	.81
11	My group members make me feel that I am not as smart as they are. *(*My group members do not make me feel that I am not as smart as they are*)	3.92	1.00

12	The material is easier to understand when I work with other students.	3.65	1.00
13	My work is better organized when I am in a group.	3.20	1.11
14	My group members like to help me learn the material.	3.40	.91
15	My group members get a good grade even if they do not do much work. *(*My group members do not get a good grade if they do not do much work*)	2.60	1.04
16	The workload is usually less when I work with other students.	3.63	1.08
17	I feel I am part of what is going on in the group.	3.94	.82
18	One student usually makes the decisions in the group. *(*One student does not make the decisions in the group*)	3.21	1.13
19	Our job is not done until everyone has finished the assignment.	3.80	1.01
20	I find it hard to express my thoughts when I work in a group. *(*I do not find it hard to express my thoughts when I work in a group*)	3.69	1.02
21	I do not think a group grade is fair. *(*I think a group grade is fair)*	2.90	1.27
22	I try to make sure my group members learn the material.	3.68	.86
23	My grade depends on how much we all learn.	3.02	1.08
24	It is difficult to get together outside of class. *(*It is not difficult to get together outside of class)*	2.54	1.20
25	I learn to work with students who are different from me.	3.55	.96
26	My group members do not care about my feelings. *(*My group members care about my feelings*)	3.78	1.01
27	I do not like the students I am assigned to work with. *(*I like the students I am assigned to work with)*	3.41	.95
28	I let the other students do most of the work. *(*I do not let the other students to do most of the work*)	4.06	.95
29	I get to know my group members well.	3.45	1.00
30	I feel working in groups is a waste of time. *(*I do not feel working in groups is a waste of time*)	3.82	1.15
31	When I work in a group I get the grade I deserve.	3.14	1.05
32	My group members do not like me. *(*My group members like me*)	4.01	.88
33	I have to work with students who are not as smart as I am. (*I have to work with students who are as smart as I am)*	3.29	1.13
34	When I work in a group there are opportunities to express your opinions.	3.88	.86
35	When I work with other students the work is divided equally.	3.11	1.17
36	We cannot complete the assignment unless everyone contributes.	3.46	1.15
37	My marks improve when I work with other students.	3.03	1.07
38	I help my group members with what I am good at.	4.03	.76
39	My group members compete to see who does better work. *(*My group members do not compete to see who does better work)*	3.72	1.00
40	The material is more interesting when I work with other students.	3.62	1.05
41	When I work in a group my work habits improve.	3.28	1.06

42	I like to help my group members learn the material.	3.67	.83
43	Some group members forget to do the work. *(*Group members remember to do the work*)	2.35	1.01
44	I do not care if my group members get good grades. *(*I care if group members get good grades*)	3.28	1.16
45	It is important to me that my group gets the work done on time.	4.23	.83
46	I am forced to work with students I do not like. *(*I am not forced to work with students I do not like)*	3.28	1.09
47	I learn more information when I work with other students.	3.36	1.06
48	It takes less time to complete the assignment when I work with others.	3.28	1.16
49	I also learn when I teach the material to my group members.	3.66	.90
50	I become frustrated when my group members do not understand the material. *(*I do not become frustrated when my group members do not understand the material*)	3.11	1.13
52	Everyone's ideas are needed if we are going to be successful.	3.87	1.00
53	When I work with other students we spend too much time talking about other things. *(*When I work with other students we do not spend too much time talking about other things*)	2.47	1.13
54	I prefer to choose the students I work with. *(*I do not prefer to choose the students I work with*)	1.67	.93

Note. Items negatively worded on the SAGE questionnaire. Reverse-coded for all analyses,

Table 3

Student Attitudes toward Group Environments Questionnaire (SAGE):

Descriptive Data: Percentages of Agreement, Disagreement, and Undecided

Item	Item Stem	A+SA[1]	U[2]	D+SD[3]
1	When I work in a group I do better quality work.	59.2	15.1	25.7
2	When I work in a group I end up doing most of the work. *(*I do not end up doing most of the work*)	44.9	23.9	31.1
3	When I work with other students I am able to work at my own pace.	44.7	17.7	37.6
4	When I work in a group I want to be with my friends. *(*When I work in a group I do not want to be with my friends)*	5.1	6.1	88.7
5	The work takes longer to complete when I work with other students. *(*The work does not take longer to complete when I work with other students*)	44.7	20.5	34.7
6	My group members do not respect my opinions. *(*My group members respect my opinions*)	75.0	17.5	7.4
7	I enjoy the material more when I work with other students.	65.9	16.9	17.2
8	My group members help explain things that I do not understand.	77.5	11.4	11.2
9	I become friends with my group members.	57.2	28.6	14.3
10	When I work in a group I am able to share my ideas.	81.4	12.0	6.6
11	My group members make me feel that I am not as smart as they are. *(*Members do not make me feel that I am not as smart as they are*)	76.0	14.3	9.7
12	The material is easier to understand when I work with other students.	67.4	15.9	16.6
13	My work is better organized when I am in a group.	49.3	20.8	29.8
14	My group members like to help me learn the material.	56.3	43.7	17.4
15	My group members get a good grade even if they do not do much work. *(*My members do not get a good grade if they do not do much work*)	22.5	25.8	51.7

16	The workload is usually less when I work with other students.	65.7	14.9	19.4
17	I feel I am part of what is going on in the group.	82.4	17.6	6.6
18	One student usually makes the decisions in the group. *(*One student does not make the decisions in the group*)	47.2	22.7	30.1
19	Our job is not done until everyone has finished the assignment.	73.8	12.9	13.3
20	I find it hard to express my thoughts when I work in a group. *(*I do not find it hard to express my thoughts*)	68.5	15.9	15.4
21	I do not think a group grade is fair. *(*I think a group grade is fair)*	35.5	23.7	40.8
22	I try to make sure my members learn the material.	71.7	17.3	11.1
23	My grade depends on how much we all learn.	37.1	29.3	33.6
24	It is difficult to get together outside of class. *(*It is not difficult to get together outside of class)*	25.9	15.9	58.2
25	I learn to work with students who are different from me.	64.7	20.6	14.7
26	My group members do not care about my feelings. *(*My members care about my feelings*)	69.4	19.7	11.0
27	I do not like the students I am assigned to work with. *(*I like the students I am assigned to work with)*	45.7	42.0	12.3
28	I let the other students do most of the work. *(*I do not let the other students to do most of the work*)	80.4	11.2	8.4
29	I get to know my group members well.	55.8	24.3	19.9
30	I feel working in groups is a waste of time. *(*I do not feel working in groups is a waste of time*)	70.4	14.3	15.3
31	When I work in a group I get the grade I deserve.	40.6	30.7	28.8
32	My group members do not like me. *(*My group members like me*)	76.2	19.6	4.2
33	I have to work with students who are not as smart as I am. *(I have to work with students who are as smart as I am)*	47.6	27.1	25.3
34	When I work in a group there are opportunities to express your opinions.	79.2	12.2	8.5
35	When I work with other students the work is divided equally.	46.6	17.9	35.6
36	We can not complete the assignment unless everyone contributes.	61.2	11.9	26.9
37	My marks improve when I work with other students.	34.6	34.7	30.7
38	I help my group members with what I am good at.	85.4	9.8	6.0
39	My group members compete to see who does better work. *(*My group members do not compete to see who does better work)*	67.6	19.4	12.9
40	The material is more interesting when I work with other students.	66.0	15.2	18.8
41	When I work in a group my work habits improve.	54.0	19.3	26.6
42	I like to help my group members learn the material.	72.2	16.5	11.4
43	Some group members forget to do the work. *(*Group members do not forget to do the work*)	15.9	18.1	66.0

44	I do not care if my group members get good grades. *(*I care if my group members get good grades*)	51.9	20.2	28.0
45	It is important to me that my group gets the work done on time.	81.9	7.4	4.7
46	I am forced to work with students I do not like. *(*I am not forced to work with students I do not like)*	47.5	30.2	22.3
47	I learn more information when I work with other students.	55.1	21.0	23.8
48	It takes less time to complete the assignment when I work with others.	55.3	12.7	32.0
49	I also learn when I teach the material to my group members.	67.8	20.3	12.0
50	I become frustrated when my group members do not understand the material. *(*I do not become frustrated when my group members do not understand the material*)	43.2	25.0	31.9
52	Everyone's ideas are needed if we are going to be successful.	75.7	12.0	12.3
53	When I work with other students we spend too much time talking about other things. *(*When I work with other students we do not spend too much time talking about other things*)	21.0	24.2	54.9
54	I prefer to choose the students I work with. *(*I do not prefer to choose the students I work with*)	6.0	8.9	85.1

Note: [1] A + SA = Agree and Strongly Agree, [2] U = Undecided, [3] D + SD = Disagree and Strongly Disagree, *Items negatively worded on the SAGE questionnaire. Reverse-coded for all analyses.

More than half of the 1066 respondents (59%) felt that they did better quality work when they worked in a group. Approximately 66% of the students agreed and strongly agreed with the statement "I enjoy the material more when I work with other students". In addition, 67.4% also felt that the material was easier to understand when they worked cooperatively. Furthermore, almost half of the respondents (49.3%) felt that when they worked cooperatively their work was better organized and that their work habits improved.

The highest agreement (88.5%) with an attitude statement was for item 4 "When I work in a group I want to be with my friends" (reverse coded). Similarly, 84.8% of the students preferred to choose the students that they work with. Students (81.4%) generally felt that they were able to share their ideas when they worked cooperatively. Similarly,

79.2% of the students reported that there were opportunities to express their opinions. Eighty-two percent of the students reported that they felt that they were part of what was going on in the group. Seventy-eight percent of the students agreed that their group members helped explain things that they did not understand. In addition, 85.4% of the students reported that they helped their group members with what they were good at. Sixty-eight percent of the students generally agreed that "I also learn when I teach the material to my group members", while 20% were undecided.

When it came to statements pertaining to evaluation student responses were varied. For example "I do not think a group grade is fair", 40.0% of the students agreed, 35.4% of the students disagreed, and 23.7% were undecided with the statement. Students agreed 37.1%, disagreed 33.6%, and were undecided 29.3% with the item, "My grade depends on how much we all learn". Students were divided when responding to the item, "My marks improve when I work with other students" (34.7% were undecided, 34.6% agreed, and 30.7% disagreed). Respondents agreed 40.6%, were undecided 30.7%, or disagreed 28.8% with the statement, "When I work in a group I get the grade I deserve". More than 80% of the students reported that they did not let the other students do most of the work. When asked if students felt that the work was divided equally 46.6% agreed, while 35.6% disagreed with the statement. An overwhelming 88% of the students reported that, "It is important to me that my group gets the work done on time".

Approximately 70% of the students reported that their group members cared about their feelings. Over 42.0% of the students reported that they were undecided when asked if they liked the students they were assigned to work with, whereas over 12% reported that they did not like their fellow members. While the majority of the students

(76.2%) reported that their group members liked them, 20% of the students were undecided. Students stated (47.5%) that they were not forced to work with students they did not like, however 30.2% of the students were undecided. While fewer than half of the students (47.6%) disagreed with item 33, "I have to work with students who are not as smart as I am", 27.1% were undecided and 25.3% agreed with the statement.

Correlations of the SAGE Items with Student Grades

Correlational analyses were performed on the SAGE items and student final grades. The results indicated that student attitudes and student academic achievement were not highly correlated as evidenced by the fact that no correlation was higher than .30. Positive correlations (2-tailed) were found among student final grades and item 4, "When I work in a group I want to be with my friends" (r = .24) and item 54, "I prefer to choose the students I work with" (r = .26). Other significant positive correlations were between student grades and item 27, "I do not like the students I am assigned to work with" (r = .18), item 33, "I have to work with students who are not as smart as I am" (r = .18), item 9, "I become friends with my group members" (r = .19), item 49, "I also learn when I teach the material to my group members" (r = .17), and item 53, "When I work with other students we spend too much time talking about other things"(r = .18). All remaining correlations were under 0.10. However, bearing in mind that the attitude literature shows that attitude-behaviour correlations although significant typically tend to be small (Kraus, 1995), the relationships reported in these findings may be viewed as being adequate.

Factor Structure and Reliability of SAGE

Exploratory factor analysis was conducted on the 54 attitude items of the SAGE questionnaire that was administered the first time to 1066 students (time 2 data were not included, $N = 710$). Factor analysis was performed in order to summarize patterns of correlations among observed variables and to reduce a large number of observed variables to a smaller number of factors (Tabachnick & Fidell, 2001). Bartlett's test of sphericity, which is a measure of multivariate normality of the set of distributions revealed that the data were approximately multivariate normal and acceptable for factor analysis ($\chi 2$ (1378) = 24336.45, $p < .000$). In addition, the Kaiser-Meyer-Olkin, which is a measure of sampling adequacy (KMO = .948) indicated that it was appropriate to proceed with factor analysis.

Examination of the correlation matrix for the 53 attitude items[1], the principal components analysis (with varimax rotation) extracted nine factors (eigenvalue > 1.0 Kaiser rule), accounting for 54.33% of the total variance in the data. The first factor alone accounted for 26.23% of the total variance. While the percentage of variance accounted for was not extremely large it did suggest that the SAGE sampled a wide range of issues students have about group learning. Cronbach's *alpha* reliability for the 53 items was .94.

With varimax rotation nine factors were extracted, however, with a cut off point of .40 for inclusion of a variable in interpretation of a factor, four out of the 53 variables did not load on any factor. By conducting a new factor analysis (varimax rotation) that excluded those specific four items (items 18, 21, 25, and 31), nine factors were again extracted, however the amount of total variance explained increased to 56.10%. Cronbach

[1] Item 51 was eliminated because it was an identical item (same as question 31) used to flag students' unreliable responding.

alpha reliabilities for each of the factors ranged from 0.94 to 0.57. At this stage of the analysis the nine factors that comprised the SAGE measure were: Factor 1: *academic support*, $\alpha = .94$; Factor 2: *peer support*, $\alpha = .85$; Factor 3*: contribution*, $\alpha = .68$; Factor 4: *disliking members,* $\alpha = .69$; Factor 5: *relying on members,* $\alpha = .57$; Factor 6: *work division,* $\alpha = .66$; Factor 7: *time,* $\alpha = .80$; Factor 8: *wanting to work with friends,* $\alpha = .60$; and Factor 9: *cohesion,* $\alpha = .73$ (see Appendix O). See Table 4 for the nine factor loadings of the 53 SAGE items.

On further inspection of the factor loadings, it became apparent that an alternative way for factor analyzing the questionnaire items was needed. The reasons were twofold: First, the scree test suggested that four factors better represented the data than a nine factor solution. The objective of the scree plot is to "visually locate an elbow, which can be defined as the point where eigenvalues form a descending linear trend" (Reise et al., 2000, p. 290). With nine factors extracted, items that tapped into similar sentiments ended up loading on different factors. For example, item 2, "When I work in a group I end up doing most of the work", loaded on Factor 5 *Work division* and item 43, "Some group members forget to do the work", loaded on Factor 6 *Relying on members.* Furthermore, with nine factors extracted, Factor 7, Factor 8, and Factor 9 each had only 2 items per factor. Factors that have too few items loading on them are not desirable due to the fact that reliability is affected (i.e., the fewer items, the lower the reliability).

Second, Reise et al. state that the commonly used eigenvalue greater than 1.0 rule is problematic because it consistently leads to too many factors being needlessly extracted. They state that although it is generally preferable to extract too many factors than too few factors, there is "no psychometrically justifiable reason to base over

extraction on the eigenvalue greater than 1.0 rule" (p. 291). Consequently, in this study a more stringent rule was used, that is, factors that had an eigenvalue of 2.0 or greater were retained. Therefore, based on the scree plot and on the decision to extract eigenvalues that are 2.0 or greater, it was concluded that a 4-factor solution best represented the data in this study

Four Factors of the SAGE Questionnaire

A new factor analysis (with varimax rotation) was performed on the 53 items with four factors requested for extraction. This time the four factors explained 41.93% of the total variance in the data (eigenvalues ranged from 13.90 to 2.04). When the 3 items (items 3, 24, and 39) that failed to load .40 or higher were deleted the amount of variance explained increased to 43.44%. Item 3, "I am able to work at my own pace" (loading .34 on Factor 1), item 24, "It is difficult to get together outside of class" (loading .36 on Factor 4), and item 39, "My group members compete to see who does better work" (loading .32 on Factor 2) were dropped from any subsequent analyses.

By factor analyzing the data again it became evident that more items should be eliminated from the SAGE questionnaire due to the fact that they no longer had a 0.4 or higher loading on a factor or due to the fact that the item had a 0.40 loading on more than one factor. For example, item 2, "When I work in a group I end up doing most of the work", had a loading of .38 on Factor 1 and .39 on Factor 4. Item 18, "One student usually makes the decisions in the group", had a main loading under the 4.0 cut off criteria (loading .38 on factor 4). Ultimately, 11 items were eliminated from the SAGE questionnaire (items 2, 3, 15, 18, 21, 22, 24, 35, 39, 42, and 51).

Table 4

Nine Factor Loadings of the SAGE questionnaire

Item no.	Academic Support	Peer Support	Contribution	Disliking members	Work Division	Relying on Members	Time	Work with Friends	Cohesion
1	.83								
40	.82								
12	.82								
41	.81								
7	.81								
13	.78								
47	.69								
42	.68								
14	.67								
22	.65								
8	.63								
37	.60								
38	.50								
30	.49								
49	.41								
11		.69							
6		.68							
17		.67							
20		.67							
10		.62							
26		.61							
34		.59							
32		.55							
45			.64						

52	.57						
19	.56						
36	.54						
28	.53						
23	.47						
44	.42						
46		.70					
27		.60					
50		.57					
33		.54					
2			.70				
15			.56				
35			.42				
16			.42				
53				.60			
43				.57			
24				.50			
3				.45			
48					.69		
5					.64		
4						.77	
54						.73	
29							.50
9							.49

In conclusion, with 11 items eliminated the total amount of variance the four factors accounted for was 46.10%. Cronbach *alpha* reliability for the remaining 43 items was 0.93. See Table 5 for the four factor loadings of the 43 SAGE items.

The four factors that comprise the SAGE measure are: *quality of product and process*, *peer support*, *student interdependence*, and *frustrations with group members*. Items on the *quality of product and process* factor pertain to the perceived academic benefits of working with other students, as expressed by the quality of work produced, ease and enjoyment of material, liking to help others, and more improved learning (e.g., "When I work in a group I do better quality work"). The *peer support* factor pertains to the personal support students give and receive when working in groups. The degree of student support as expressed by respecting each others' opinions, feeling liked and

Table 5

Four Factor Loadings of the SAGE questionnaire

Item no.	Quality of product and process	Peer Support	Student interdependence	Frustrations with group members
1	.85			
40	.83			
41	.82			
12	.81			
13	.81			
7	.80			
47	.73			
37	.73			
14	.62			
8	.60			
30	.60			
48	.56			
5	.54			
16	.53			
31	.47			
6		.70		
20		.68		

11	.66		
26	.66		
32	.65		
17	.62		
10	.60		
34	.58		
52		.63	
45		.61	
36		.53	
19		.52	
28		.50	
49		.49	
23		.47	
44		.45	
25		.41	
9		.41	
38		.40	
29		.40	
54			.60
4			.54
46			.51
27			.51
50			.51
53			.49
43			.44
33			.43

involved with the group activities, and feeling valued as group members (e.g., "When I work in a group I am able to share my ideas"). The third factor *student interdependence* is the degree to which students contribute to the group process and product, there is equal participation, and evaluation depends on the grades of other members (e.g., "Everyone's ideas are needed if we are going to be successful"). The final factor *frustrations with group members* deals with the frustrations experienced when working with less academically competent members, disliking the assigned group members, and wanting to work with friends (e.g., "I prefer to choose the students I work with"). (See Appendix P for the SAGE factors and Appendix Q for the justifications for the factor analysis

procedures).

Cronbach *alpha* reliabilities for each of the four factors ranged from 0.93 to 0.69. Factor 1 had a Cronbach's *alpha* of 0.93 (15 items) with Corrected Item-Total Correlations ranging from 0.82 to 0.48 ($M = 51.42$, $SD = 11.45$). Factor 2 had a Cronbach's *alpha* of 0.85 (eight items) with Corrected Item-Total Correlations ranging from 0.63 to 0.50 ($M = 31.03$, $SD = 5.06$). Factor 3 had a Cronbach's *alpha* of 0.78 (12 items) with Corrected Item-Total Correlations ranging from 0.55 to 0.32 ($M = 43.94$, $SD = 6.39$). Factor 4 had a Cronbach's *alpha* of 0.69 (eight items) with Corrected Item-Total Correlations ranging from 0.48 to 0.22 ($M = 21.21$, $SD = 4.65$). Although factor 4 did not have high Corrected Item-Total Correlations, the factor proved to be useful in subsequent analyses, namely when used in multiple regression to predict final grades. Cronbach's *alpha* reliability for the 43 items in total was .93. Overall, due to the relatively high *alpha* coefficients of the subscales of the SAGE questionnaire it may be deemed that the questionnaire meets the reliability standards. Furthermore, the results of split half-reliability for the 43 items of the SAGE questionnaire were $\alpha = 0.89$ for part 1 (27 items) and $\alpha = 0.88$ for part 2 (26 items). Correlation between forms was $r = 0.87$.

Attitudes of Male versus Female Students

In order to examine if student attitudes toward working in small groups were influenced by gender, independent *t* tests were conducted on the student's responses ($N = 1066$). The findings suggested that male and female students responses differed significantly on three out of the four SAGE factors. Overall, student responses differed according to gender on the *peer support, student interdependence*, and *frustrations with group members* factors, but not on the *quality of product and process* factor. Female

students reported more positive attitudes on the *peer support* factor (N = 553, M = 31.48, SD = 4.77) than did male students (N = 513, M = 30.53, SD = 5.31), t (1064) = -3.07, $p < .001$. Female students expressed more positive attitudes on the *student interdependence* factor (N = 553, M = 44.94, SD = 5.97) than did male students (N = 513, M = 42.86, SD = 6.66), t (1064) = -5.35, $p < .001$. In addition, female students expressed more positive attitudes on the *frustrations with group members* factor (N = 553, M = 21.90, SD = 4.55) than did male students (N = 513, M = 20.47, SD = 4.65), t (1064) = -5.04, $p < .001$.

In addition to the SAGE factors, the individual SAGE items were also examined. Table 6 shows the results of the significant differences between male and female responses on the SAGE questionnaire. The findings suggested that male and female students responses differed significantly on 21 out of the 43 SAGE items. The largest difference between male attitudes and female attitudes was on item 33, "I have to work with students who are not as smart as I am" (reverse coded). Male students agreed less (M = 3.06) than female students that they have to work with students who are as smart as they are (M = 3.49), t (1064) = -6.33, $p < .001$. Another significant difference between male students and female students was on item 52, "Everyone's ideas are needed if we are going to be successful". Males did not perceive that every member's contribution was vital to the success of the group (M = 3.68) as much as females did (M = 4.05), t (1064) = -6.23, $p < .001$.

Female students perceived that they learn when they teach their peers (M = 3.81) more than male students (M = 3.50), t (1064) = -5.74, p < .001. Female students felt that their group members cared about their feelings (M = 3.93) more than did their male peers

($M = 3.61$), t (1064) = -5.09, $p < .001$. Another main difference between males and females was the perception of letting other group members do most of the work. Female students felt that they did not let the other students do most of the work ($M = 4.12$) more than did male students ($M = 3.92$), t (1064) = -4.63, $p < .001$. Overall, female students had more positive attitudes towards working in cooperative groups as evidenced by the fact that they reported that the material was easier to understand, they learned more information, group members liked to help them learn the material, group members helped explain things, and group members respected their opinions.

Table 6

Attitude Differences between Male and Females Students

Item Stem	*Gender*	*M*	*SD*	*t* Ratio	*df*	Sig.
1. I do better quality work	Males	3.33	1.11	-.88	1064	$p = 0.38$
	Females	3.39	1.00			
4. I want to be with my friends	Males	1.58	0.78	-1.69	1064	$p = 0.09$
*(*I do not want to be with my friends)*	Females	1.67	0.92			
5. The work takes longer to complete	Males	3.19	1.19	+1.10	1064	$p = 0.27$
	Females	3.11	1.14			
*(*The work does not take longer to complete*)						
6.My group members do not respect my opinions	Males	3.79	0.98	-3.74	1064	$p < .001$
	Females	3.99	0.78			
*(*My group members respect my opinions*)						
7. I enjoy the material more	Males	3.59	0.98	-1.58	1064	$P = 0.12$
	Females	3.69	0.78			
8. My group members help explain things	Males	3.72	1.02	-4.01	1064	$p < 0.001$
	Females	3.95	0.85			
9. I become friends with my group members	Males	3.48	1.03	-1.50	1064	$p = 0.14$
	Females	3.57	0.89			
10. I am able to share my ideas	Males	3.88	0.87	-1.37	1064	$p = 0.17$
	Females	3.95	0.75			

11.My group members make me feel that I am not as smart *(*My group members do not make me feel that I am not as smart)*	Males Females	3.90 3.95	1.06 0.94	-0.88	1064	$p = 0.38$
12. The material is easier to understand	Males Females	3.57 3.72	1.15 1.07	-2.51	1064	$p < 0.05$
13. My work is better organized	Males Females	3.20 3.22	1.02 0.96	-0.35	1064	$p = 0.73$
14 My group members like to help me learn the material	Males Females	3.28 3.50	0.97 0.84	-3.92	1064	$p < 0.001$
16. The workload is usually less	Males Females	3.67 3.59	1.12 1.03	+1.19	1064	$p = 0.23$
17. I feel I am part of what is going on	Males Females	3.94 3.94	0.84 0.80	-0.01	1064	$p = 0.99$
19. Our job is not done until everyone has finished	Males Females	3.72 3.88	1.09 0.93	-2.70	1064	$p < 0.01$
20. I find it hard to express my thoughts *(*I do not find it hard to express my thoughts)*	Males Females	3.68 3.70	1.04 1.00	-0.26	1064	$p = 0.80$
23. My grade depends on how much we all learn	Males Females	2.96 3.08	1.18 0.98	-1.80	1064	$p = 0.07$
25. I learn to work with students who are different from me	Males Females	3.46 3.63	1.03 0.88	-2.96	1064	$p < 0.05$
26. My group members do not care about my feelings *(*My group members care about my feelings*)	Males Females	3.61 3.93	1.01 0.90	-5.09	1064	$p < 0.01$
27. I do not like the students I am assigned to work with *(*I like the students I am assigned to work with)*	Males Females	3.35 3.47	1.00 0.90	-2.13	1064	$p < 0.05$
28.I let the other students do most of the work *(*I do not let the other students to do most of the work*)	Males Females	3.92 4.12	1.03 0.85	-4.63	1064	$p < 0.001$
29. I get to know my group members well	Males Females	3.42 4.48	1.03 0.98	-0.98	1064	$p = 0.33$
30. I feel working in groups is a waste of time *(*I do not feel working in groups is a waste of time*)	Males Females	3.73 3.91	1.22 1.08	-2.50	1064	$p < 0.05$

31. When I work in a group I get the grade I deserve	Males Females	3.13 3.14	1.12 0.99	-0.19	1064	$p = 0.85$
32. My group members do not like me *(*My group members like me*)	Males Females	3.95 4.06	0.94 0.81	-2.14	1064	$p < 0.05$
33. I have to work with students who are not as smart (*I have to work with students who are as smart)*	Males Females	3.06 3.49	1.19 1.02	-6.33	1064	$p < 0.001$
34. When I work in a group there are opportunities to express your opinions	Males Females	3.78 3.96	0.95 0.76	-3.41	1064	$p < 0.001$
36. We can not complete the assignment unless everyone contributes	Males Females	3.33 3.57	1.21 1.08	-3.35	1064	$p < 0.001$
37. My marks improve when I work with other students	Males Females	3.07 2.99	1.13 1.00	+1.21	1064	$p = 0.23$
38. I help my group members with what I am good at	Males Females	3.96 4.09	0.80 0.72	-2.56	1064	$p < 0.01$
40. The material is more interesting	Males Females	3.57 3.67	1.09 1.01	-1.52	1064	$p = 0.13$
41. When I work in a group my work habits improve	Males Females	3.22 3.34	1.09 1.02	+1.21	1064	$p = 0.23$
43. Some group members forget to do the work *(*Group members remember to do the work*)	Males Females	2.32 2.39	1.03 1.00	-1.09	1064	$p = 0.28$
44. I do not care if my group members get good grades *(*I care if group members get good grades*)	Males Females	3.19 3.36	1.20 1.12	-2.37	1064	$p < 0.05$
45. It is important to me that my group gets the work done on time	Males Females	4.24 4.22	0.84 0.82	+0.30	1064	$p = 0.76$
46. I am forced to work with students I do not like *(*I am not forced to work with students I do not like)*	Males Females	3.15 3.39	1.16 1.02	-3.51	1064	$p < 0.001$
47. I learn more information	Males Females	3.29 3.43	1.10 1.02	-2.15	1064	$p < 0.05$
48. It takes less time to complete the assignment	Males Females	3.31 3.26	1.17 1.14	+0.65	1064	$p = 0.52$
49. I also learn when I teach the material	Males Females	3.50 3.81	0.97 0.80	-5.74	1064	$p < 0.001$

50. I become frustrated when my members do not understand the material *(*I do not become frustrated when my members do not understand the material*)	Males Females	2.96 3.26	1.16 1.10	-4.31	1064	$p < 0.001$
52. Everyone's ideas are needed	Males Females	3.68 4.05	1.09 0.87	-6.23	1064	$p < 0.001$
53. We spend too much time talking *(We *do not spend too much time talking*)	Males Females	2.41 2.53	1.11 1.14	-1.75	1064	$p = 0.08$
54. I prefer to choose the students I work with *(*I do not prefer to choose the students I work with*)	Males Females	1.64 1.69	0.94 0.91	-1.01	1064	$p = 0.32$

Note. Items negatively worded on the SAGE questionnaire. Males ($N = 513$), Females ($N = 553$).

Attitude Stability and Change

Test-retest reliability for the SAGE measure was examined via the correlations for each item for time 1 and time 2. Although 1066 students responded to the SAGE questionnaire only 710 students responded to it a second time, therefore, the reported correlations are on 710 students that completed the questionnaire twice. See Table 7 for the correlations of the SAGE items, time 1 and time 2.

Overall, the correlations were positive and ranged from 0.63 to 0.36. The highest correlations between time 1 and time 2 were for items: item 1, "When I work in a group I do better quality work" ($r = .61$), item 12, "The material is easier to understand when I work with other students" ($r = .62$), item 30, "I feel working in groups is a waste of time" ($r = .63$), item 35, "When I work with other students the work is divided equally" $r = .60$,

Table 7

Correlations of the SAGE Items: Time 1 and Time 2

Item	Item	*r*
1	When I work in a group I do better quality work.	.61
2	When I work in a group I end up doing most of the work. *(*I do not end up doing most of the work*)	.56
3	When I work with other students I am able to work at my own pace.	.48
4	When I work in a group I want to be with my friends. *(*When I work in a group I do not want to be with my friends*)	.55
5	The work takes longer to complete when I work with other students. *(*The work does not take longer to complete when I work with other students*)	.53
6	My group members do not respect my opinions. *(*My group members respect my opinions*)	.48
7	I enjoy the material more when I work with other students.	.57
8	My group members help explain things that I do not understand.	.47
9	I become friends with my group members.	.52
10	When I work in a group I am able to share my ideas.	.52
11	My group members make me feel that I am not as smart as they are. *(*My members do not make me feel that I am not as smart as they are*)	.50
12	The material is easier to understand when I work with other students.	.62
13	My work is better organized when I am in a group.	.55
14	My group members like to help me learn the material.	.48
15	My group members get a good grade even if they do not do much work. *(*My group members do not get a good grade if they do not do much work*)	.48
16	The workload is usually less when I work with other students.	.52
17	I feel I am part of what is going on in the group.	.45
18	One student usually makes the decisions in the group. *(*One student does not make the decisions in the group*)	.51
19	Our job is not done until everyone has finished the assignment.	.43
20	I find it hard to express my thoughts when I work in a group. *(*I do not find it hard to express my thoughts when I work in a group*)	.53
21	I do not think a group grade is fair. *(*I think a group grade is fair*)	.54
22	I try to make sure my group members learn the material.	.47
23	My grade depends on how much we all learn.	.41
24	It is difficult to get together outside of class. *(*It is not difficult to get together outside of class*)	.51
25	I learn to work with students who are different from me.	.45
26	My group members do not care about my feelings. *(*My group members care about my feelings*)	.52
27	I do not like the students I am assigned to work with. *(*I like the students I am assigned to work with*)	.46

28	I let the other students do most of the work. *(*I do not let the other students to do most of the work*)	.48
29	I get to know my group members well.	.51
30	I feel working in groups is a waste of time. *(*I do not feel working in groups is a waste of time*)	.63
31	When I work in a group I get the grade I deserve.	.53
32	My group members do not like me. *(*My group members like me*)	.54
33	I have to work with students who are not as smart as I am. (*I have to work with students who are as smart as I am*)	.59
34	When I work in a group there are opportunities to express your opinions.	.46
35	When I work with other students the work is divided equally.	.60
36	We cannot complete the assignment unless everyone contributes.	.56
37	My marks improve when I work with other students.	.59
38	I help my group members with what I am good at.	.36
39	My group members compete to see who does better work. *(*My group members do not compete to see who does better work*)	.47
40	The material is more interesting when I work with other students.	.62
41	When I work in a group my work habits improve.	.57
42	I like to help my group members learn the material.	.41
43	Some group members forget to do the work. *(*Group members remember to do the work*)	.47
44	I do not care if my group members get good grades. *(*I care if group members get good grades*)	.50
45	It is important to me that my group gets the work done on time.	.40
46	I am forced to work with students I do not like. *(*I am not forced to work with students I do not like*)	.57
47	I learn more information when I work with other students.	.60
48	It takes less time to complete the assignment when I work with others.	.51
49	I also learn when I teach the material to my group members.	.52
50	I become frustrated when my group members do not understand the material. *(*I do not become frustrated when my group members do not understand the material*)	.54
52	Everyone's ideas are needed if we are going to be successful.	.57
53	When I work with other students we spend too much time talking about other things. *(*When I work with other students we do not spend too much time talking about other things*)	.56
54	I prefer to choose the students I work with. *(*I do not prefer to choose the students I work with*)	.43

Note. Items negatively worded on the SAGE questionnaire. Reverse-coded for all analyses, $N = 710$.

item 40, "The material is more interesting when I work with other students"*(r* = .62), and item 47, "I learn more information when I work with other students" (*r* = .60). The lowest correlation for an item between the first and second administering of the SAGE measure was for item 38, "I help my group members with what I am good at" (*r* = .36).

In order to examine if student attitudes toward working in groups changed over time dependent *t* tests (paired-samples) were conducted on the student's responses on the SAGE factors from time 1 and time 2 (*N* = 710). Results from this analysis revealed that there were no significant differences in student attitudes between the first and second time the SAGE questionnaire was administered. That is, student responses were stable over time.

However, when the SAGE items were examined separately there was change over time for 14 SAGE items (Time 1 versus Time 2). In order to examine overall attitude change all items were included. Table 8 shows the results of this analysis.

Fewer students reported that they did better quality work in groups after having worked in groups for a period of time, (time 1 *M* = 3.39, time 2 *M* = 3.32). Students reported that they wanted to work with their friends less after having worked in groups (time 1 *M* = 1.61, time 2 *M* = 1.72, reverse coded). Over time students reported that they enjoyed the material less when working in groups (time 1 *M* = 3.63, time 2 *M* = 3.56). Fewer students agreed that their group members explained the material to them when they

Table 8

Difference between SAGE Items Time 1 and SAGE items Time 2

Item Stem	Mean difference	*SE* of mean	*t* Ratio	*df*	Sig.
1.I do better quality work	+0.07	.04	+1.96	709	$p < 0.05$
2. I end up doing most of the work *(*I do not end up doing most of the work*)	-0.06	.04	-1.74	709	$p = 0.08$
3.I am able to work at my own pace	+0.06	.04	+1.47	709	$p = 0.14$
4. I want to be with my friends *(*I do not want to be with my friends*)	-0.11	.03	-3.47	709	$p < 0.001$
5. The work takes longer to complete *(*The work does not take longer to complete*)	-0.04	.04	-1.00	709	$p = 0.32$
6.My group members do not respect my opinions *(*My group members respect my opinions*)	+0.06	.03	+1.72	709	$p = 0.09$
7. I enjoy the material more	+0.07	.04	+1.97	709	$p < 0.05$
8. My group members help explain things	+0.13	.04	+3.37	709	$p < 0.001$
9. I become friends with my group members	+0.03	.04	+0.83	709	$p = 0.41$
10. I am able to share my ideas	+0.05	.03	+1.48	709	$p = 0.14$
11.My group members make me feel that I am not as smart *(*My group members do not make me feel that I am not as smart*)	+0.07	.04	+1.96	709	$p < 0.05$
12. The material is easier to understand	+0.09	.03	+2.62	709	$p < 0.05$
13. My work is better organized	+0.15	.04	+3.82	709	$p < 0.001$
14 My group members like to help me learn the material	+0.12	.04	+3.24	709	$p < 0.001$

15. My group members get a good grade *(*My group members do not get a good grade)*	+0.03	.04	+0.74	709	$p = 0.46$
16. The workload is usually less	+0.03	.04	+0.67	709	$p = 0.50$
17. I feel I am part of what is going on	+0.03	.03	+1.02	709	$p = 0.31$
18. One student usually makes the decisions in the group *(*One student does not make the decisions in the group*)	+0.09	.04	+1.93	709	$p = 0.06$
19. Our job is not done until everyone has finished	-0.05	.04	-1.18	709	$p = 0.24$
20. I find it hard to express my thoughts *(*I do not find it hard to express my thoughts)*	+0.03	.04	+0.81	709	$p = 0.42$
21. I do not think a group grade is fair *(*I think a group grade is fair)*	-0.02	.04	-0.35	709	$p = 0.72$
22. I try to make sure my group members learn the material	+0.06	.03	+1.76	709	$p = 0.08$
23. My grade depends on how much we all learn	+0.05	.04	+1.25	709	$p = 0.21$
24. It is difficult to get together outside of class *(*It is not difficult to get together outside of class)*	+0.18	.04	+4.07	709	$p < 0.001$
25. I learn to work with students who are different from me	-0.10	.04	-2.78	709	$p < 0.01$
26. My group members do not care about my feelings *(*My group members care about my feelings*)	+0.00	.04	+0.07	709	$p = 0.99$
27. I do not like the students I am assigned to work with *(*I like the students I am assigned to work with)*	+0.03	.04	+0.67	709	$p = 0.50$

28, I let the other students do most of the work *(*I do not let the other students to do most of the work*)	+0.02	.03	+0.60	709	$p = 0.55$
29. I get to know my group members well	+0.03	.04	+0.69	709	$p = 0.49$
30. I feel working in groups is a waste of time *(*I do not feel working in groups is a waste of time*)	+0.09	.04	+2.37	709	$p < 0.05$
31. When I work in a group I get the grade I deserve	+0.02	.04	+0.40	709	$p = 0.69$
32. My group members do not like me *(*My group members like me*)	+0.05	.03	+1.66	709	$p = 0.10$
33. I have to work with students who are not as smart (*I have to work with students who are as smart)*	+0.10	.04	+2.53	709	$p < 0.01$
34. When I work in a group there are opportunities to express your opinions.	+0.05	.03	+1.54	709	$p = 0.13$
35. The work is divided equally	-0.04	.04	-0.98	709	$p = 0.33$
36. We can not complete the assignment unless everyone contributes	+0.02	.04	+0.45	709	$p = 0.66$
37. My marks improve when I work with other students	+0.01	.04	+0.13	709	$p = 0.90$
38. I help my group members with what I am good at	-0.04	.03	-1.31	709	$p = 0.19$
39. My group members compete *(*My group members do not compete)*	+0.03	.04	+0.82	709	$p = 0.41$
40. The material is more interesting	+0.02	.04	+0.60	709	$p = 0.55$
41. When I work in a group my work habits improve	+0.11	.04	+3.05	709	$p < 0.01$
42. I like to help my group members learn the material	+0.05	.03	+1.42	709	$p = 0.16$

43. Some group members forget to do the work *(*Group members remember to do the work*)	+0.00	.04	+0.04	709	$p = 0.97$
44. I do not care if my group members get good grades *(*I care if group members get good grades*)	+0.03	.04	+0.68	709	$p = 0.50$
45. It is important to me that my group gets the work done on time	+0.03	.03	+0.95	709	$p = 0.34$
46. I am forced to work with students I do not like *(*I am not forced to work with students I do not like*)	+0.02	.04	+0.47	709	$p = 0.64$
47. I learn more information	-0.01	.04	-0.20	709	$p = 0.85$
48. It takes less time to complete the assignment	-0.15	.04	-3.45	709	$p < 0.001$
49. I also learn when I teach the material	-0.03	.03	-0.85	709	$p = 0.40$
50. I become frustrated when my members do not understand the material *(*I do not become frustrated when my members do not understand the material*)	-0.07	.04	-1.60	709	$p = 0.11$
52. Everyone's ideas are needed	+0.09	.04	+2.57	709	$p = 0.01$
53. We spend too much time talking *(*we do not spend too much time talking*)	+0.00	.04	+0.09	709	$p = 0.93$
54. I prefer to choose the students I work with *(*I do not prefer to choose the students I work with*)	-0.06	.04	-1.85	709	$p = 0.07$

Note. Items negatively worded on the SAGE questionnaire. Reverse-coded for all analyses, $N = 710$.

did not understand (time 1 M =3.84, time 2 M = 3.71). There was a decrease in sentiment that the material was easier to understand when working with other students (time 1 M = 3.66, time 2 M = 3.57).

Fewer students felt that their group members made them feel that they were not as smart (time 1 M = 3.96, time 2 M = 3.89). Fewer students felt that that their work was better organized when they worked in a group (time 1 M = 3.25, time 2 M = 3.10). There was also a decrease in feelings that group members liked to help them learn the material (time 1 M = 3.44, time 2 M = 3.32). Fewer students reported that it was difficult to get together outside of class the second time the SAGE questionnaire was administered (time 1 M = 2.57, time 2 M = 2.39). More students reported that they learned with students who were different from themselves after having spent time in groups (time 1 M = 3.55, time 2 M = 3.65). Fewer students felt that working in groups was a waste of time (time 1 M = 3.83, time 2 M = 3.75). There was a decrease in student's reporting that they had to work with students who were not as smart as they were (time 1 M = 3.29, time 2 M = 3.20). Fewer students felt that their work habits improved when working in groups (time 1 M = 3.33, time 2 M = 3.22). More students indicated that it takes less time to complete the assignment when working with others (time 1 M = 3.25, time 2 M = 3.40).

Although there was significant change for some items between time 1 and time 2, the change was not very drastic. For example, student attitudes did not change from one extreme to another, extremely positive to extremely negative. That is, the biggest change was for item 24, "It is difficult to get together outside of class" (M change 0.18).

Student Attitudes Predictive of Grades

Multiple regression analysis was used to investigate the relationship between student grades[2] (DV) and student attitudes toward working in groups (IV). The items from the SAGE questionnaire that were related to each of the four factors were summed in order to create composite scores and entered as predictors into hierarchical multiple regression. Tabachnick and Fidell (2001) suggest that the rule of thumb in regression analysis when testing individual predictors is $N > 104 + m$ (m is the number of IVs), thus indicating the need to have a sample size of at least 108 participants. This criteria was met ($N = 122$). The four factors *quality of product and process*, *peer support*, *student interdependence*, and *frustrations with group members* were entered as predictors (via stepwise selection) in order to produce a regression analysis that identifies which of the independent variables have the greatest influence on student final grades. The "stepwise method of selection will first enter the independent variable with the highest bivariate correlation with the dependent variable, then enter the variable that explains the greatest additional amount of variance, then enter a third variable and so forth until no other variables significantly influence the dependent variable" (George & Mallery, 2003, p. 201).

The results were significant, $F(1, 120) = 8.21$, $p < .01$. Overall, there was one significant predictor that explained 6.4% proportion of the variance in student final grades. Table 9 shows the results of the multiple regression. The only predictor of student grades was Factor 1 *quality of product and process* ($\beta = -.25$). The value of β, the standardized regression coefficient, represents the unique variance explained by each

[2] While 1066 students filled out the SAGE questionnaire, achievement data (final course grade) was permitted to be collected on the college students only ($N = 122$).

predictor (Tabachnick & Fidell, 2001).

Table 9

Results of Multiple Regression Analysis of Student Final Grade on the Four SAGE Factors

Factor	Standardized β	t ratio	Significance
Constant		15.20	$p < 0.01$
Factor 1: Quality of product and process	-0.25	-2.87	$p < 0.01$

Overall, the results pertaining to the predictive validity of the SAGE questionnaire suggested that only one factor labeled *quality of product and process* predicted student learning as measured by the final grade, but the amount of variance accounted for was small (< 7%). Surprisingly, the *quality of product and process* factor was negatively related to course achievement. The essence of this factor pertained to student perceptions that when students worked in a group they did better quality work, the material was easier and more interesting, etc. It would be assumed that the more students perceived that their learning improved, that their subsequent grades in the course would also improve, which was not the case.

One reason for this result may be, that the more students perceived that group learning was beneficial to their learning, the less they felt that they had to produce at the individual level, thus influencing their academic achievement. That is, the more students felt that the other group members would contribute to the group process, the less they themselves were required to do on their own. Therefore, the depth that the material was covered by the individual student, work intensity, and perseverance with the subject matter may have been influenced. While small group learning entails interdependent learning, it still requires that every member master the material independently so that it

can be shared with their peers.

An alternative explanation may be, that although students perceived that the quality of their learning was enhanced, students may not have been engaging in behaviours that were necessary for effective student learning. That is, the attitude-achievement link may be incomplete without examining the behavioural aspects of small group learning. For instance, did students ask for assistance when they needed it? Were they reluctant to seek help in fear of looking ignorant to their peers? If they did seek assistance, were the appropriate questions asked? When students asked for help did their members provide information that was timely, elaborated, and most importantly correct? While one of the aims of this research was to examine how group behaviours were related with student attitudes and student grades, the time-sampling method used to collect observational data did not answer these types of questions.

Observational Component

Observational data were collected as students worked in cooperative small groups. Eighteen small group behaviours were selected to be observed via time-sampling. Cronbach *alpha* reliability for the observational data was 0.78. The means and standard deviations for the18 behaviours are presented in Table 10, for all the observed students combined, as well as, for each school setting separately.

Table 10

Observed Behaviour Categories: Means and Standard Deviations

Behaviours	Data from all schools[1]	School 1[2]	School 4[3]	School 5[4]
Asks for help (QS)				
M	6.12	8.87	5.94	3.24
SD	7.07	10.08	5.18	3.62
Is asked for help (QT)				
M	3.91	6.23	3.64	1.68
SD	4.48	6.22	3.11	2.20
Giving Information (GI)				
M	19.59	19.57	26.38	8.68
SD	18.23	20.08	18.73	6.31
Receiving Information (RI)				
M	10.69	12.21	13.03	5.20
SD	10.38	12.56	10.11	4.66
Giving Elaboration (GE)				
M	1.06	1.66	1.21	.12
SD	2.48	3.60	2.09	.40
Receiving Elaboration (RE)				
M	.38	.62	.44	.02
SD	1.04	1.53	.86	.16
Group Procedures (GP)				
M	.44	.45	.65	.07
SD	.86	.88	.98	.35
Progress and Evaluation (EV)				
M	.01	.00	.02	.02
SD	.11	.00	.12	.16
Listening (LI)				
M	12.44	7.66	20.09	5.61
SD	12.22	9.62	12.74	5.43
On-task (ON)				
M	31.36	51.43	27.18	15.10
SD	27.07	33.76	17.09	15.65
Harmonizing (HA)				
M	.36	.09	.09	.20
SD	1.88	.74	.74	1.25
Encouraging (EN)				
M	.14	.02	.30	.00
SD	.44	.15	.63	.00
Putdowns (PD)				

M	.08	.00	.11	.15
SD	.36	.00	.36	.53
Withdrawing (WD)				
M	1.51	3.11	.85	.73
SD	2.91	4.15	1.86	1.66
Off-task (OF)				
M	4.77	8.19	2.20	5.00
SD	6.10	7.75	2.48	6.20
Reading Text (RD)				
M	10.68	13.45	11.33	6.46
SD	9.54	11.20	9.32	5.90
Checking understanding (CH)				
M	1.34	2.10	1.50	.20
SD	2.18	2.86	1.99	.58
Joking (JK)				
M	1.90	2.64	1.94	.98
SD	3.50	5.42	2.28	1.70

Note.[1] Combined data from school 1, 4, and 5, $n = 154$.
[2] School 1 is a CEGEP, $n = 47$.
[3] School 4 is a CEGEP, $n = 66$.
[4] School 5 is a high school, $n = 41$.

Relationships among Behaviours and Grades

Correlational analyses were performed in order to examine the relationships among the observed student behaviours. See Table 11 for the correlations among the behaviours. The highest correlation ($r = .89$) was between the behaviour asking a question or for help (QS) and the behaviour receiving information (RI). Interestingly asking a question (QS) and receiving an elaborated response (RE) had a more moderate correlation ($r = .67$). Asking a question (QS) was positively correlated with giving information (GI) ($r = .75$), checking one's understanding (CH) ($r = .72$), being asked a question (QT) ($r = .66$),

non-verbal on-task behaviour (ON) ($r = .69$), and with reading text (RD) ($r = .68$).

Being asked for help (QT) and giving information (GI) were highly correlated ($r = .76$), as was being asked for help (QT) and receiving information (RI) ($r = .68$).

Being asked for help (QT) was also positively related with on-task behaviour (ON) (r = .71), with reading text (RD) (r = .64), and with checking one's own understanding (CH) (r = .62). Receiving information (RI) was correlated with checking one's understanding (CH) (r = .74), reading text (RD) (r = .70), on-task behaviour (ON) (r = .68), giving elaborations (GE) (r = .60), receiving elaborations (RE) (r = .60), and with group procedures (GP) (r = .61).

Correlational analyses were also performed on the student behaviours exhibited during group work and student final grades. As stated previously achievement data were only collected on the CEGEP students (N = 122). Significant positive relationships were found between student grades and asking a question (QS), (r = .65) and being asked a question (QT), (r = .65). Giving information (GI) to group members was related to grades, (r = .81), as was receiving information (RI), (r = .71). Interestingly, giving elaborations (GE) and receiving elaborations (RE) were not highly correlated with grades (r = .44, r = .25, respectively). Nonverbal on-task behaviours (ON) were correlated with student grades, (r = .78), as was reading text (RD), (r = .73). Surprisingly off-task behaviours (OF) were also positively correlated with grades, (r = .55). Checking one's own understanding (CH) was modestly related with student grades, (r = .56). Group procedures (GP) information was related with grades, (r = .49). Listening to a third-party conversation (LI) was also correlated to achievement, (r = .70). Finally, joking among group members (JK) was related to student grades, (r = .56).

Table 11

Correlations among Observed Behaviours and Final Grades

Beh.	QS	QT	GI	RI	GE	RE	ON	OF	RD	CH	EV	LI	HA	EN	PD	WD	GP	JK	G
QS	-																		
QT	.66**	-																	
GI	.75**	.76**	-																
RI	.89**	.68**	.83**	-															
GE	.51**	.56**	.65**	.60**	-														
RE	.67**	.31**	.41**	.60**	.41**	-													
ON	.69**	.71**	.67**	.68**	.37**	.24**	-												
OF	.44**	.50**	.46**	.39**	.22**	.09**	.75**	-											
RD	.68**	.64**	.69**	.70**	.36**	.27**	.80**	.56**	-										
CH	.72**	.62**	.66**	.74**	.46**	.47**	.62**	.38**	.57**	-									
EV	.06*	.06*	.08**	.08**	-.01	.05	.07*	-.01	.06*	.04	-								
LI	.36**	.39**	.55**	.46**	.22**	.12**	.48**	.38**	.53**	.32**	.05	-							
HA	.06	.11**	.06	.06	.01	.04	.16**	.05	.05	.03	-.00	.09**	-						
EN	.21**	.22**	.30**	.30**	.08*	.05	.20**	.07*	.23**	.14**	-.00	.27**	-.01	-					
PD	.20**	.05	.25**	.31**	.05	.02	.13**	.05	.14**	.11**	-.00	.14**	-.00	.21**	-				
WD	.30**	.35**	.26**	.26**	.14**	.12**	.53**	.49**	.34**	.28**	-.00	.19**	.20**	.15**	.03	-			
GP	.59**	.42**	.56**	.61**	.49**	.37**	.40**	.18**	.45**	.44**	.23**	.23**	.09**	.38**	.18**	.20**	-		
JK	.49**	.40**	.55**	.47**	.19**	.11**	.51**	.40**	.49**	.49**	.03	.37**	.08*	.31**	.31**	.20**	.33**	-	
G	.65**	.65**	.81**	.71**	.44**	.25**	.78**	.55**	.73**	.56**	.09**	.70**	.11**	.32**	.20**	.38**	.49**	.56**	-

Beh = Behaviours, QS = Asks for help, QT = Is asked for help, GE = Giving elaboration, RE = Receiving elaboration, GI = Giving information, RE = Receiving information, CH = Checking understanding, GP = Group procedures, EV = Evaluation and Progress, LI = Actively listening, On = On-task, RD = Reading text, HA = Harmonizing, EN = Encouraging, JK = Joking, OF = Off-task, PD = Putdowns, WD = Withdrawing, G = Grades. ** $p < 0.05$ (two-tailed), * $p < 0.05$ (one-tailed), $N = 122$.

Factor Analysis

Exploratory factor analysis was conducted on the 14 behaviour categories in order to reduce the data and create composite scores for the observational data. Observational data were collected on 154 out of the 1066 students. Although an *N* of 154 is not relatively large, it was adequate in order to perform factor analysis. Tabachnick and Fidell (1989) and Gorsuch (1983) suggest a general rule for estimating the sample size needed to conduct factor analysis as being at least five cases for each observed variable. Everitt (1975, as cited in MacCallum, Widaman, Zhang, & Hong, 1999) recommend at least 10 cases for each observed variable. MacCallum et al., (1999) provide a theoretical framework that suggests that common rules of thumb regarding sample size in factor analysis as not being valid or useful. MacCallum et al. suggest that "when communalities are consistently high (greater than .6), then that aspect of sampling that has a detrimental effect on the model fit and precision of parameter estimates receives a low weight, thus greatly reducing the impact of sampling size and other aspects of the design" (p. 96).

Due to the fact that four behaviours (18 behaviours in total were included in this study) occurred infrequently they were dropped from further analyses. That is, there was very little data recorded for the *progress and evaluation (*EV), *harmonizing* (HA), *encouraging* (EN), and *putdowns* (PD) categories. For example, *progress and evaluation (*EV) interactions occurred only twice in this study. Therefore, the sample size of 154 participants was adequate to perform factor analysis based on the following criteria: (a) the 10 cases to one variable ratio was met; (b) the communalities for nine out of the fourteen behaviours were .6 and greater; (c) the Bartlett's test of sphericity revealed that the data were approximately multivariate normal and acceptable for factor analysis, $\chi 2$

(91) = 11705.42, $p < .000$; (d) the Kaiser-Meyer-Olkin (KMO = .901) also indicated that it was appropriate to proceed with factor analysis; (e) the resulting loadings on the factors were high; and (f) the resulting amount of variance explained was high.

Based on the scree plot two factors were requested to be extracted via principal components analysis and varimax rotation. See Table 12 for the factor loadings of the behaviour categories. The total amount of variance accounted for was 64.12%. The first factor alone accounted for 52.46% of the total variance. The eigenvalues for the two factors ranged from 7.34 to 1.63. The first factor labeled *seeking content knowledge,* contains categories that pertain to student interactions as they try to learn information by asking questions (QS), giving information (short answers) (GI), giving elaborations or explanations (GE), receiving information (short answers) (RI), receiving elaborations or explanations (RE), checking one's own understanding (CH), and group procedure information (GP). The second factor, labeled *solitary/off-task* , contains both verbal and nonverbal behaviours that students engage in that are not part of the verbal exchanges exhibited during group work. These behaviours include on-task activity (ON) (nonverbal), off-task activity (OF) (verbal and nonverbal), being asked questions (QT), reading text (RD) (nonverbal), withdrawing (WD) (nonverbal), joking (JK) (verbal), and listening (LI) (nonverbal).

Table 12

Two Factor Loadings of the Behaviour Categories

Behaviours	Factor 1 Seeking Content Information	Factor 2 Solitary/Off-Task
Receiving information (RI)	.84	
Asks for help (QS)	.80	
Receiving elaboration (RE)	.78	
Giving elaboration (GE)	.73	
Giving information (GI)	.71	
Group procedures (GP)	.69	
Checking understanding (CH)	.68	
On –task (ON)		.85
Off-task (OF)		.84
Reading text (RD)		.73
Withdrawing (WD)		.62
Asked for help (QT)		.59
Joking (JK)		.59
Actively listening (LI)		.59

$N = 154$.

The first factor, *seeking content information* ,had a Cronbach *alpha* of 0.76 (seven behaviours) with Corrected Item-Total Correlations ranging from 0.97 to 0.51 ($M = 0.99$, $SD = 3.61$). Factor 2, *solitary/off-task,* had a Cronbach *alpha* of 0.71 (seven behaviours) with Corrected Item-Total Correlations ranging from 0.84 to 0.48 ($M = 1.63$, $SD = 5.25$). Due to the overall high *alpha* for the observational categories and for high *alpha* coefficients for the two factors, it can be deemed that the observational data are reliable.

Group Behaviours Predictive of Grades

Multiple regression was used to investigate the relationship between student grades (DV) and behaviours exhibited when working in groups (IV). Based on the factor analysis results, composite scores were created for the behavioural data and the two

composite scores were then entered as predictors into multiple regression. That is, the behavioural factor labeled *seeking content information* and the behavioural factor labeled *solitary/off-task* were entered as predictors (via stepwise selection) in order to identify which of the independent variables had the greatest influence on student final grades. Table 13 shows the results of the multiple regression.

Table 13

Results of Multiple Regression Analysis of Student Final Grade on the Two Factors (Behavioral Categories)

Factor	Standardized β	t ratio	Significance
Constant		+35.35	$p < 0.001$
Factor 1: Seeking content information	+0.25	+14.81	$p = 0.01$

The results were significant, $F(1, 120) = 8.22$, $p < .01$. Overall, there was one significant predictor that explained 6.4% of the variance in student final grades. That is, Factor 1 *seeking content information* predicted student academic achievement ($\beta = +.25$). That is, group interactions, that included asking questions, giving and receiving information and elaborations, checking one's own understanding, and providing group procedural information, were positively related to course achievement.

Predictive Adequacy of Attitudes and Behaviours Combined

Multiple regression (stepwise) was used to investigate the relationship between student grades (DV) and student attitudes (via the SAGE questionnaire) and behaviours (via observations) exhibited when working in groups (IV). Based on the factor analysis results the four composite scores for the SAGE questionnaire (*quality of product and process*, *peer support*, *student interdependence*, and *frustrations with group members*)

and the two composite scores for the behaviour categories (*seeking content information* and *solitary/off-task)* were entered as predictors into hierarchical multiple regression. Table 14 shows the results of the multiple regression.

Table 14

Results of Multiple Regression Analysis of Student Final Grade on the Behavioural Factors (behavioral categories) and the attitudinal factors (SAGE)

Factor	Standardized β	*t* ratio	Significance
Constant		+14.69	$p < 0.001$
Factor 1: Seeking content information (Behaviour)	+0.26	+3.08	$p = 0.001$
Factor 1: Quality of product and process (SAGE)	-0.26	-3.08	$p = 0.001$

The results were significant, F (2, 119) = 9.14, $p < .001$. Overall, there were two significant predictors that explained 13.3% of the variance in student final grades. The behavioural factor, *seeking content information,* predicted student academic achievement, as well as, the *quality of product and process* factor of the SAGE questionnaire.

Overall, the results pertaining to the predictive validity of the behavioural factors in conjunction with the SAGE questionnaire factors suggested: (a) one behavioural factor labeled, *seeking content information,* positively predicted student learning as measured by the final grade ($\beta = +.26$); and (b) factor 1 labeled, *quality of product and process,* of the SAGE questionnaire was also a negative predictor of grades ($\beta = -.26$).

Correlations among Attitudes and Behaviours and Grades

Correlational analyses were performed to examine if attitudes toward small group learning and group behaviours were related. Composite scores of the four factors of the SAGE measure and composite scores of the two factors of the behavioural data were

used. See Table 15 for the correlations among attitudes, behaviours, and grades.

Table 15

Correlations among Student Attitudes, Behaviours, and Grades

	Factor 1[1] (SAGE)	Factor 2[2] (SAGE)	Factor 3[3] (SAGE)	Factor 4[4] (SAGE)	Factor 1[5] Behaviours	Factor 2[6] Behaviours	Grade
Factor 1	-						
Factor 2	+.61**	-					
Factor 3	+.76**	+.70**	-				
Factor 4	+.34**	+.38**	+.35**	-			
Factor 1	+.04	+.08	+.04	+.04	-		
Factor 2	-.06	+.06	-.07	+.25**	+.31**	-	
Grade	-.25**	-.06	-.09	-.12	+.25**	-.02	-

[1] Factor 1: Quality of product and process
[2] Factor 2: Peer support
[3] Factor 3: Student interdependence
[4] Factor 4: Frustrations with group members
[5] Factor 1: Seeking content information
[6] Factor 2: Solitary/Off-task
** $p < 0.05$ (two-tailed)
$N = 122$.

The results indicated that the highest correlation was between Factor 4 *frustrations with group members* (attitudes) and Factor 2 *solitary/off-task* (behaviours) ($r = +.25$). The SAGE factor labeled *frustrations with group members* consisted of items that assessed the frustrations that students experienced when working with others (e.g., "I do not like the students I am assigned to work with"). The *solitary/off-task* category consisted of mainly non-interactive behaviours (e.g., withdrawing). Therefore, the more students reported that they were frustrated with their group members, the more solitary/off-task behaviours were exhibited during group work. This finding can be viewed as either: (a) the higher the frustration level with group work, the more students engaged in solitary tasks, such as, reading text and other on-task nonverbal behaviours (students learning on their own); or (b) the higher the frustration level with group

members, the more uncooperative members became, as evidenced by withdrawing or exhibiting off-task behaviours (disruptive behaviours affecting group learning). Thus, it can be concluded that student frustration with group members leads to more individual learning and/or a decreased level of cooperation in the group. Therefore, in order to maintain group cohesion and a climate of cooperation, feelings of frustration must be addressed and resolved in order for optimal learning to be achieved in a group environment. Teachers need to monitor group functioning so that they may mediate when necessary, or to provide time so that members may reflect upon their progress and resolve task and socio-emotional issues.

In examining the relationships of the attitudinal and behavioural factors with student achievement, it was apparent that the highest positive correlation with student grades was a behavioural factor. A significant positive correlation was found between the behavioural factor *seeking content knowledge* and student grades ($r = +.25$). Consistent with the cooperative learning literature, behaviours, such as, giving information and receiving information, were positively related with final course grades. That is, the more students asked for and received help (simple and elaborated answers), checked their own understanding, and discussed group procedures, the more student learning was enhanced.

Consistent with the results of the regression analysis, the SAGE factor *quality of product and process* was negatively related with student grades ($r = -.25$). As previously discussed, this finding is unexpected, since it would be anticipated that the more students reported that their learning improved in a group, their grades in the course would also improve. As discussed earlier, the perception that the quality of work is enhanced in a group environment, may lead to decreased input from the individual. Students may

erroneously conclude that by having other students to rely on to do the work translates as less work to be done on their part. Consequently, members who are academically stronger may also decrease their involvement if they feel others are relying heavily on their contributions. Salomon and Globerson (1989) refer to these phenomena respectively as the "freerider" and the "sucker" effects. They also suggest that the "ganging up on the task" effect often occurs during group work, in which, students pretend to look busy and go through the motions of working without making major contributions to the group. Thus, decreased student involvement may negatively influence student learning and performance.

Hancock's (2004) research provides an alternative insight as to why student perceptions pertaining to the quality of their group learning negatively influenced course grades. His findings suggested that students often supported and reinforced misunderstanding of the material rather than challenging and correcting misconceptions. Analysis of videotapes indicated that students made erroneous comments, and that the other group members did not have a thorough understanding of the material to realize that the information was incorrect. The teacher was involved with other students, and was not aware of the situation. One student's written remark reflected the fact that members left the group with an incomplete understanding of the key concepts. "Usually, we assumed that whoever spoke first in our group had the right answer. So we all wrote it down and hoped it was correct" (p. 164). Therefore, there may be a mismatch between a student's perception that learning is enhanced in a group situation and proper learning of course content.

Summary

This chapter provided information pertaining to the results and findings of the attitudinal and behavioural data collected in this study. Pertaining to the SAGE questionnaire, information was provided on: the descriptive data, factor structure and reliability, correlations of the SAGE items with student final grades, attitudes of male versus female students, attitude stability and change, and student attitudes predictive of grades. Regarding the behavioural data information was provided on: relationships among behaviours and grades, factor structure, group behaviours predictive of grades, predictive adequacy of attitudes and behaviours combined, and correlations among attitudes and behaviours and grades.

DISCUSSION AND CONCLUSIONS

In attempting to maximize student learning educators and researchers are constantly trying to understand key elements that are necessary for student learning to be productive, meaningful, and enjoyable. Educators are frequently required to update their learning methods and practices and implement strategies in their classrooms that have been proven to be beneficial for student learning. Recent worldwide reforms in education have emphasized inquiry, as well as active and self-directed learning (Chin & Kayalvizhi, 2005). In the province of Québec, changes are also presently being made to the educational system (Quebec Education Program) in attempts to make "learning an active and ongoing process of construction of knowledge" (Ministère de l' Èducation du Québec, 2000, p. 9).

However, smooth transitional change from existing classroom practices to the incorporation of innovative methods that have been documented in educational research as being effective is not always an easy process. The effective implementation of cooperative learning strategies in classrooms where the teacher traditionally lectures the students and the students are actively listening rather than actively interacting is often times fraught with obstacles. Students' perceptions, views, attitudes, and behaviours play an instrumental role as to whether a teaching method will be successful in the classroom. Kinchin (2004) claims that "while teachers attend training courses that help them cope with breaks from traditional ways of working, pupils have not benefited from such support and may use their collective power to resist or subvert an innovation" (p. 302). Harland (2001, as cited in Kinchin) suggests that "the voice of the learner has largely been absent from research, and, therefore, the educational product is not properly aligned

to the needs of the consumer" (p. 302). Thus, the voice of the student learner must be heard and represented in small group learning so that the documented benefits of cooperation can reach the students.

Dart et al. (2000) purport that there have been few attempts to relate learning methods to perceptions of the learning environment of secondary school classrooms. Gentry et al. (2002) also suggest that student views and perceptions are important to consider when designing effective educational experiences. Pfaff and Huddleston (2003) recently conducted a study that investigated various factors that have an impact on undergraduate students' attitudes toward teamwork. Their findings indicated that project grades, perceived workload, time in class for project work, use of peer evaluations, and absence of a "free-rider" problem were significant predictors of attitudes toward teamwork.

Measuring student attitudes toward small group learning and observing group behaviours that occur in high school and college classrooms will provide insights that will ultimately strengthen the cooperative learning approach. The Student Attitudes toward Group Environments (SAGE) questionnaire was developed with this rationale in mind. The purpose of this research was to design a measure that captured the essence of cooperative group work from the learner's perspective. What students like and do not like about cooperative group work needs to be systematically captured so that educators will persevere with cooperative group learning in their classrooms. The findings from this research indicated that the SAGE questionnaire is a valuable instrument for it serves both as a diagnostic measure and as a predictive measure.

SAGE Questionnaire Serves as a Diagnostic Measure

The SAGE questionnaire was useful in capturing student attitudes on a number of positive and negative aspects of working cooperatively not previously addressed in the cooperative learning literature. Many of the items tapped issues of group processes such as equality of participation, feelings of group cohesion and belonging, ease of expressing ideas and feelings, and perceptions of task and socio-emotional support (Levine & Moreland, 2004). Generally, students expressed positive attitudes toward working with other students in the classroom. Students reported that they did better quality work, the material was easier, more enjoyable, and more interesting. In addition, students expressed that their work was better organized and that their work habits improved. Students also felt that group members respected their opinions, that they became friends with their group members, that group members cared about their feelings, and were liked by their group members. In addition, students reported that they liked to help other students, members liked to help them learn, learned to work with students that were different from them, learned more information when working with other students, and felt that they also learned when they taught the material to their group members.

Overall, the majority of the high school and college level students had positive attitudes towards working in small groups. Over 80% of the respondents expressed that: (a) they helped their fellow group members; (b) they felt that they were part of what was going on in the group; (c) they were able to share ideas and express their views; and (d) getting the work done in time was important to them. The group dynamics literature indicates that in order for groups to be effective and successful in achieving their common goal, members must be able to express their ideas and feelings to their fellow

members (Johnson & Johnson, 2000; Levine & Moreland, 2004). Members need to feel accepted by the others and cohesion among members must be present (Forsyth, 1999; Napier & Gershenfeld, 2004). Furthermore, in order for groups to be successful there needs to be equal participation among the members and that the decision making power is shared. Conversely, in ineffective groups one member monopolizes the discussion, the decision making process, and the leadership role in the group (Johnson & Johnson, 2000).

Participants in this study did not feel that one student usually made the decisions in the group. While four out of five students perceived that they did not take advantage of their group members (e.g., "I let the other students do most of the work"), more than half of the respondents felt that members received a good grade even if they did not do much work. As Salomon and Globerson (1989) suggest, negative effects such as the "free rider" and the "sucker" often emerge when students work in groups. Group members often perceive that they are taken advantage of by other members and consequently withdraw, consciously or unconsciously, their participation from the group. It is interesting to note, that while students perceived that other members were more prone to taking advantage of the group situation they did not see themselves in the same light. There may be an ego-defense mechanism operating when students respond to an attitude measure or perhaps a high level of inner-reflection is needed on the part of the respondent.

Interestingly, one area of high student agreement is group assignment. The manner in which students are assigned to work in groups evoked strong student attitudes. This was evidenced by the fact that 89% of the students stated, "When I work in a group I want to be with my friends", and 85% of the students stated, "I prefer to choose the

students I work with". There was a very strong sentiment toward working with friends, even more so than fairness of evaluation and work division. This finding may be explained by the research of Wentzel, McNamara-Barry, and Caldwell (2004) who report that friendships play a role in students' social and academic adjustment in school. Students who have friends in school tend to be more sociable, cooperative, prosocial, and self-confident when compared to students who do not have friends. Wentzel et al. (2004) claim that during adolescence students are psychologically invested in the peer group and need their friends for support. They report that student friendships promote prosocial behaviour "because prosocial behaviour is inherently social and interactive, a friends' prosocial behaviour will provide straightforward cues concerning what is appropriate and desirable as well as provide a positive experience for the recipient" (p. 201).

While wanting to work with friends contradicts the findings of a meta-analysis performed by Springer et al. (1999) that various procedures for placing students into groups (e.g., student selected or teacher selected) do not influence achievement or attitudes, it is a reoccurring finding throughout the history of the SAGE measure. In the process of developing the SAGE questionnaire steps were taken to enhance validity by having cooperative learning consultants, teachers, and students rate a pool of 290 items considered for inclusion for relevancy to group work. According to the item medians the item, "When I work in a group I want to be with my friends", was ranked 180th by trainers, 23rd by teachers, and 11th by students. This discrepancy of what is considered relevant in group learning must not be ignored. Teachers are usually discouraged from letting students work with their friends because friends tend to be "alike" and the literature shows that students learn more when working in mixed ability groups.

Furthermore, classroom management issues may take precedent over student feelings. Do and Lemonnier-Scallert (2004) suggest that teachers should consider more closely the potential effect of social aspects in the class on students' emotional well-being. Serious consideration should be given to how students are placed in groups. Perhaps on some occasions teachers may allow some flexibility over group assignment especially when groups are to work on a task for a short period of time.

Kinchin (2004) claims that there is a growing recognition of the importance of the "student voice" and that "secondary school students *are* capable of commenting upon their learning" (p. 310). Hancock (2004) suggests that students perform better when they are allowed to learn in their preferred manner. However, his findings also showed that socializing with group members sometimes took precedent over working on the course content. Videotapes of students working together revealed that on a few occasions students spent much time discussing topics unrelated to the content and then hurriedly finished the group task in the last few minutes of the group session.

As reported, one of the main aims of the SAGE questionnaire was to serve as a diagnostic measure in which student attitudes can be reliably captured and assessed so that potentially problematic features of working cooperatively can be circumvented. By highlighting issues that students feel strongly about, working in groups can lead to predetermined solutions than can help minimize student frustration and resentment. Group members vary in what they bring to the group in terms of skills, values, attitudes, personalities, and cognitive styles (McGrath, Arrow, & Berdahl, 2000). As the group dynamics literature illustrates working with others will ultimately lead to situations of conflict. Frequently, conflict whether it caused by conflicting ideas, motivations, or

personalities may be viewed as a necessary element that propels group members to achieving their common goal. However, some times conflict among group members may paralyze the group and stop it from being productive.

Levine and Moreland (2004) suggest that conflict among groups is either primarily cognitive (disagreements over group goals or procedures) or interpersonal (treating each other disrespectfully). In a classroom setting adolescents may not have the necessary skills to help them move past the conflict so that the group can be successful. Students may treat one another disrespectfully especially if there are status differentials operating in the group with low achievers being consistently ignored (Blumenfeld et al., 1996). Levine and Moreland (2004) state that self-esteem is strongly influenced when comparisons of performance are made in the group. They state that "learning that one's performance is inferior to that of a close other on a personally relevant dimension is particularly distressing and elicits efforts to reduce either the performance inferiority, the personal relevance of the dimension, or the closeness of the other" (p. 169). Thus, feelings of inferiority in the group may lead to decreased satisfaction and liking of groups.

Most cooperative learning implementations, as well as research studies, are conducted in grade 3 - 9 classrooms and the results of the few studies that have been conducted at the college level have been inconclusive (Hancock, 2004). Less cooperative learning is conducted at the high school and college level and thus less is known of the dynamics operating with older students. In this study, second year CEGEP students often expressed during informal conversations that they did not mind helping their group members learn the material but they resented being evaluated as a group. They felt that

their grades (which are critical for acceptance into the university of their choice) should not be contingent upon another classmate who may not be as academically inclined. Phipps, Phipps, Kask, and Higgins (2001) also found similarly espoused sentiments when they investigated university students' perceptions of cooperative learning. Students resented depending on others for grades, particularly on midterm exams. Although shared grades enforced interdependence, it was viewed as a negative aspect of cooperation instead of a positive one.

Hancock's (2004) research findings on graduate students working cooperatively in an educational research methods course also revealed that many students were worried that they would fail the course due to motivational differences of group members and jeopardize their goal of earning a master's degree. Thus, this fear of failure influenced peer orientation (the extent to which a person prefers to work on tasks alone or with others). That is, students with high peer orientation became more interested in working with others, while students with low peer orientation preferred to work alone. Therefore, students tend to have negative sentiments about group learning when they feel that the performance of their fellow group members may have future far-reaching consequences outside of that particular classroom setting. Thus, if students perceive that working cooperatively is a hindrance to their own future personal success, negative attitudes and resentment may result. The findings from the SAGE questionnaire revealed that student responses pertaining to items of group evaluation were mixed. Forty percent of the respondents reported that they felt that a group grade was not fair, while 24% were undecided. Only 35% of the students reported that their marks improved when they worked with others and the remaining 65% students either disagreed or were undecided.

Mulryan's (1992) research findings revealed that high achieving students did not like helping their lower-ability group members. Students would tend to avoid helping their peers in order to complete the group task faster. Students in this study reported that they did not become frustrated when group members had problems understanding the material (43.2%), while 25% of the students were undecided. Fifty-two percent of the students stated that they cared if group members received good grades, while 20% of the students were undecided. While 15% of the students felt that working in groups was a waste of time, more than 70% of the participants felt otherwise.

SAGE Questionnaire Serves as a Predictive Measure

In order for a newly developed measure to be useful in educational research the psychometric properties must be evaluated. The findings from this research attest to the adequacy of the reliability and validity properties of the SAGE instrument. One of the main strengths of the SAGE questionnaire was the steps taken during the course of development to enhance content validity. Content validity is defined as the degree to which a test measures the content that it is designed to measure (Sax, 2004). Several steps were undertaken in order to generate items that came from various sources that assessed a multitude of aspects of small group learning. As previously reported, the data used to develop the initial item pool (475 items) came from three sources: (1) 15 statements created from informal interviews conducted with students ($N = 39$) enrolled in an English literature course at a junior college; (2) 65 statements gleaned from structured questionnaire responses from grade nine students ($N = 41$) asked to list positive and negative aspects of small group work; and (3) 495 items from twelve existing measures. Of these items, 290 were rated for their relevancy to small group work by three sets of

judges: students, teachers, and cooperative learning trainers/consultants. Forty-one items were selected to represent the highest rated categories and considered deviations among judging groups. Nineteen of the items were from existing questionnaires; 21 of the items were from student generated statements.

The questionnaire was further refined in order to be used in the present research, thus the final version of the SAGE questionnaire consisted of 54 attitudinal items and five background questions. In order to determine the underlying factor structure of the attitude items and to determine composite scores of each factor to be subsequently used to predict academic achievement, exploratory factor analysis was performed. With principal components analysis (varimax rotation) it was determined that a four factor solution best represented the data. The results of the factor analysis revealed that the SAGE questionnaire is comprised of four factors: *quality of product and process, peer support, student interdependence,* and *frustrations with group members.* The *quality of product and process* factor (e.g., "My group members like to help me learn the material", "My group members help explain things that I do not understand") is consistent with factors found in other classroom environment measures. For example, the Classroom Life Instrument (Johnson, Johnson, & Anderson, 1983) has a factor labeled *student academic support* (e.g., "In this class other students care about how much I learn") that pertains to the academic support students receive from their group members that influence how they learn and how much they learn.

The *peer support* factor of the SAGE measure (e.g., "I feel I am part of what is going on in the group") contains items that tap the essence of the *student personal support* factor (e.g., "In this class other students like me as much as they like others") of

the Classroom Life Instrument. Similarly, the Group Climate Questionnaire (Hurley & Brooks, 1988) has a factor labeled *cared* (e.g., "The members liked and cared about each other"). In addition, the Learning Environment Inventory (LEI) (Fraser et al., 1982) has a factor labeled *cohesiveness* (e.g., "All students know each other well"), the College and University Classroom Environment Inventory (CUCEI) (Fraser et al., 1986) has a factor labeled *student cohesiveness* (e.g., "Friendships are made among students in this class"), and the Classroom Attitudes Scale (CAS) (Zahn et al., 1986) has a factor labeled *social relations* (e.g., "I feel friendly toward many of the students in this class"). However, the LEI, CUCEI, and the CAS assess the social climate of the whole class as opposed to the small group environment.

The essence of the *student interdependence* factor (e.g., "We cannot complete the assignment unless everyone contributes") is similar to the *positive goal interdependence* factor (e.g., "I have to make sure that the other members learn if I want to do well on the assignment") and the *resource interdependence* factor (e.g.," When we work together in small groups everyone's ideas are needed if we are going to be successful") from the Classroom Life Instrument.

However, due to the fact that student views were incorporated into the development of the SAGE questionnaire many of the items that comprise these factors are unique and are not represented in other measures. The final factor *frustration with group members* was not reflected in existing inventories. Items from factor four: "When I work in a group I want to be with my friends"; "I do not like the students I am assigned to work with"; "I have to work with students who are not as smart as I am"; "Some group members forget to do the work"; "I am forced to work with students I do not like"; "I

become frustrated when my group members do not understand the material"; "When I work with other students we spend too much time talking about other things"; and "I prefer to choose the students I work with". Therefore, the SAGE questionnaire provided new insights that may help improve cooperative learning implementations. It is important to acknowledge that students are often the best sources of relaying what actually happens in a cooperative learning environment. Therefore, much thought must be put into the manner in which students are placed in groups. Negative attitudes may be evoked when students with different academic abilities, motivations, and goals are instructed to work together. However, giving students the choice to work with friends or students they like may lead to off-task discussions that although may increase enjoyment of the group task, may also decrease learning of the course content.

The main objective of this research was to develop a new and comprehensive questionnaire that highlighted issues toward small group learning not previously addressed in the literature was achieved. Furthermore, not only did the SAGE questionnaire prove to be useful in capturing new dimensions, it also proved to be a reliable measure. The overall Cronbach *alpha* reliability for the measure was 0.93 and the *alphas* for the four factors ranged from .93 to .69, thus attesting that the questionnaire is indeed reliable. Test-retest reliability was conducted by examining the correlations of item responses between the first and second administering of the SAGE questionnaire. Overall, the correlations were positive and ranged from 0.63 to 0.36. The examination of SAGE attitude means in this study revealed that overall the student responses were quite stable between the first time the questionnaire was administered (Time 1) and the second time (Time 2). Although, there was significant change for 14 of the SAGE items (as

evidenced by the dependent *t* tests) the change was not very drastic. Surprisingly, student attitudes were less positive over time. These results contradict the meta-analysis results of Springer et al. (1999) that indicate that the longer students spend learning in groups the more positive their attitudes become.

Examination of student responses (Time 2) revealed that fewer students agreed that: (a) they did better quality work in groups; (b) they enjoyed the material more in a group; (c) the material was easier to understand; (d) their work was better organized when working in a group; (e) their group members explained the material to them; and (f) their work habits improved. On a positive note, fewer students reported that their group members made them feel that they were not as smart as the other students. Fewer students felt that they had to work with students that were not as smart as they were. More students agreed that they learn to work with students who are different from themselves.

Female student attitudes on the SAGE measure were also compared to male student attitudes. The results revealed that female students generally had more positive attitudes than male students. Female students were more prone to agreeing that every member had to contribute their ideas if the group was to be successful. Female students felt that the other members cared about their feelings and respected their opinions. Furthermore, they felt that their learning increased when they helped their team members and consequently the other members liked to help them learn the material. These findings contradict the findings of Thomas-Hunt and Philips (2004) that suggest that women's ideas are not as readily accepted as much as the male group members regardless of the content expertise women possess.

The predictive ability of the SAGE questionnaire can be assessed by the degree

the attitude questionnaire predicts final course grades. Predictive ability is the correlation between test scores and performance on a criterion where there is a time lapse between the two (Sax, 2004). Overall, the composite score for the *quality of product and process* factor of the SAGE questionnaire explained 6.4% of the variance in student final grades. While the variance accounted for may not seem large at first, the results are consistent with findings of the meta-analysis performed by Kraus (1995) that indicated that attitudes account for only 14% of the variance in behaviour (or in this case academic performance). While attitudes are useful as a construct in terms of explaining phenomena their predictive ability may not be very high. Kraus contends that correlations among attitudes and behaviours may not be large but they can be statistically significant. McIntyre, Paulson, Lord, and Leper (2004) claim that the empirical relationship between attitudes and behaviours is known to be approximately .40.

Attitudes and Behaviours

In addition to attitudinal data, observational data were collected while students worked on a cooperative group task. Some of the behaviours selected for observation were task, maintenance or social, and self-oriented behaviours determined from the group dynamics literature (Taylor & Moghaddam, 1994) or behaviours that were extracted from the cooperative learning literature (Webb, 1991; Webb & Farivar, 1993). Task behaviours include offering new ideas, contributing relevant information, asking for clarification, etc. Social or maintenance behaviours include encouraging less talkative members to participate, attempting to resolve conflicts among members, helping provide a good climate for the group, etc. Self-oriented behaviours are ones that tend to interfere with the group's process. That is, behaviours that detract from what the group is trying to do such

as attacking other members, not being involved in the group, taking up the group's time with irrelevant comments, etc. (Schultz, 1996).

The results of this study indicated that student attitudes toward small group learning and group behaviours predicted the same amount of variance in student academic achievement. Attitudes (*quality of product and process* factor) and behaviours (*solitary/off-task* factor) each predicted 6.4% of the variance in student grades. When the composite scores were entered for student attitudes and group behaviours combined the amount of variance in grades explained was 13.3%, thus, suggesting that group behaviours, in conjunction with attitudinal data, are useful in explaining academic achievement.

Certain student behaviours exhibited during small group learning were related to student final course grades. Consistent with the work of Hertz-Lazarowitz (1993), Webb (1989; 1991), and Webb and Mastergeorge (2003), asking questions, being asked questions, giving and receiving information, and generally remaining on-task until the task was completed were related to student grades. Surprisingly, giving and receiving elaborations were not highly correlated to grades. Typically, it is expected that an explanation enhances learning rather than a short answer without further elaboration.

Gilles and Ashman (1998) suggest that Bales's process interaction analysis can be used to explain how simple task-related interactions contribute to learning. Bales analysis showed that when students seek suggestions, opinions, or information from others, they generally receive five responses per question. Thus, the more information students receive (although it may be short answers), the more information they will incorporate in the final product and therefore learning will be enhanced.

Giving and receiving information or help are fundamental behaviours in a cooperative setting. Karabenick (2003) conducted a study on college students' levels of help-seeking threat, their intentions to seek help, help-seeking goals, preferred helping resources, class-related motivation and use of learning strategies. The results indicated that help-seeking avoidant students were more anxious, performed more poorly, and had higher mastery avoid and higher performance avoid achievement goal orientations. Interaction in groups is a key feature of learning processes and it is often mediated by issues of status. Shelly and Shelly (2004) state that advantaged members are asked for opinions more often, express opinions more often, and are more likely to receive positive rewards for their contributions.

An interesting note is that there was far less off-task activity going on and even less putdown behaviour observed during small group functioning than opponents of cooperative learning may expect. Overall, students were on-task and most of the time was spent in giving, asking, and receiving content information. There were very few progress and evaluation comments, as well as, harmonizing and encouraging comments expressed by group members. Harmless teasing between group members frequently occurred either in attempts to make the task more enjoyable or to create cohesion among the members. During the pilot week of observations it was determined that an extra category (joking, JK) had to be included in the observation scheme, which was inherently different from the putdown category. Joking among group members was positively related to student grades. This finding is inconsistent with the findings of Horn et al. (1998) that suggest that students who enjoy interacting with other students may engage in off-task behaviour, such as casual conversation, rather than taking the time to learn the material. Thus,

individuals who liked their partners learned less than individuals who did not like their partners.

The plethora of research shows that cooperative group work in classrooms promotes cognitive and affective outcomes such as: academic achievement; attitudes toward subject matter and classmates; academic self-esteem; and social and working relationships between mixed sex, mixed-ability, and mixed-ethnic groups (Johnson et al., 2000; Springer et al., 1999). While working cooperatively has its documented benefits, cooperating with others may evoke strong emotions in students. Strong student attitudes may influence the effectiveness of cooperative learning strategies in the classroom. A reliable and valid instrument is needed in order to systematically capture and assess the impact of student attitudes toward small group learning.

Perhaps cooperative learning can be most beneficial on student learning, productivity, and motivation when used in moderation. "All cooperative learning all the time" may not be necessary. Recent research by Tauer and Harackiewicz (2004) suggests that competition and cooperation both have positive aspects on intrinsic motivation and performance in a sport setting. They suggest that researchers should be discouraged from polarizing cooperation and competition and treating them as an "either/or" proposition. The meta-analysis performed by Stanne, Johnson, and Johnson (1999) also suggests that competition influences enjoyment of the task as well as productivity. Cooperation among individuals is necessary for achieving common goals in and out of classroom settings and thus, cooperative skills are necessary to cultivate in educational settings. In conclusion, a quote from a grade 7 participant from Mueller and Fleming's (2001) ethnographic research may represent the general sentiment of students in this study, "I think learning to

work in a group is really good; I don't always like it, but it's a good skill to have" (p. 264).

Implications for Educators

Based on the ongoing changes presently taking place in the educational system, and in the business sector as well, there is an increased demand for cooperative skills. Students are required to work together on group tasks and projects, to communicate, and to problem solve effectively. Learning to work efficiently in a team is crucial for future success. However, cooperation in educational settings is not without inherent problems. Many educators are faced with student resistance when trying to implement small group learning strategies in the classroom, especially when students are used to whole-class frontal teaching. The SAGE questionnaire provided insights as to the aspects of small group learning that elicit positive and negative student attitudes. Therefore, the SAGE questionnaire can be used as a "troubleshooting" guide by teachers in terms as to how to assign students to groups, evaluate group projects, structure the task for equal participation, and how to improve student interactions. Based on the results of this study the following recommendations can be made.

First, students need to feel that they have a choice in their learning environment (Hancock, 2004). On many occasions, students are informed by their teachers that participation in a cooperative group is mandatory and that working alone on a task is not an option. Some students may be reluctant to work with others due to their perception that they have relatively less academic ability than their peers or lower peer status. This can be a difficult situation for introverted students who feel uncomfortable publicly expressing their views and ideas. Higher ability students may also feel that they are being

held back due to the fact that they have to help their group members learn the material. As expressed in this study, students prefer to work with their friends. In most situations, there is an established level of comfort and trust between friends (Wentzel et al. 2004).

Responses on the SAGE questionnaire also revealed that students prefer to choose their group members. Typically, teacher-assigned groups are recommended, in order for students to have the exposure of working with students who are different from themselves (in terms of, ability, gender, personality, etc), and for classroom management problems to be minimized. However, students may be given control over group assignment, and the teacher may intervene and change group assignment if the need arises. While some student socializing is expected, educators should monitor the group functioning so that off-task social discussions do not detract the group from achieving their group goals. The fact that students reported that they wanted to choose their fellow group members, may hint at something deeper. Perhaps, students have an underlying need to feel a sense of control over their learning environment. Possibly, students need to feel that they have a "voice" and a "choice" when it pertains to their academic learning. Students are not passive recipients of learning in classrooms, they may deem it necessary to influence decisions that affect the quality of their learning. Kinchin (2004) states that the role of the student voice in the curriculum is now starting to be acknowledged.

Group evaluation is usually an issue of contention with students. Student responses on the SAGE measure indicated that student views were varied. Approximately half of the students felt that group members received a good grade even if they did not do their share of the work. Only 35% of the students felt that their grades improved when they worked in a group. Similarly, only 35% of the students felt that a group grade was

fair. Students often fear that their grades will suffer when they work with others or that the other students will unfairly benefit from their efforts. According to Phipps et al. (2001) students are resentful when they have to share grades with other students, more so with tests than with projects. One recommendation is that group grades not be assigned, but rather some other form of recognition or tangible reward be given. If group evaluation is necessary, then perhaps a small percentage of the final course grade should be based on group work. Common strategies for making grades interdependent include: group grade on a single project; averaging members' individual scores; individual score plus group average; and randomly selecting one member's paper to score. While group grades are one method of creating positive interdependence in a cooperative situation, there runs the risk of negative feelings being promoted rather than a sense of cohesion. Slavin (1990, 1995) contends that grades should only reflect the individual performance of the student receiving that grade.

Unequal contribution and unequal division of labour are frequently cited problems of small group learning. Fewer than half of the respondents on the SAGE questionnaire felt that the work was divided equally. Over 66% of the students felt that group members forget to do the work. This issue can be addressed by periodically changing group membership or by increasing individual accountability (Pfaff & Huddleston, 2003). Other options include assigning roles to group members or dividing necessary resources among members so that each member must contribute if the group is to be successful. Educators must stress that everyone is obligated to participate, and also, find ways to accurately determine that every member is accountable for doing their share of their work. Peer evaluations can also be used to evaluate individual contributions and group processes (De

Hoyos & Resta, 2005). However, when peer evaluations are used, teachers should probe further to determine if students are being truthful in their evaluations and not protecting the noncontributing member. That is, a student may feel uncomfortable to expose a friend, or reluctant to be truthful because of repercussions.

An overall positive attitude towards cooperation is needed in order for students to reap the benefits of small group learning. While students in this study reported a general positive attitude towards group learning, approximately 30% agreed or were undecided when responding to the item, "I feel working in groups is a waste of time". Educators must assert the importance of cooperation or teamwork in real-life and work situations. The fact that interpersonal skills are acquired when working with others must be stressed. Teachers can develop an intervention plan so that students understand the benefits of cooperation, as well as, the significance of the contributions of their fellow group members. Team building activities are one way of enhancing a cooperative atmosphere in the classroom. Teambuilding activities are useful in creating a bond and a sense of cohesion among group members. If groups are to remain together for a lengthy period of time or if the cooperative task is such that some tensions may occur, then teambuilding is a must. Teachers may also use some form of social skills training in order to promote more effective group learning. Students can benefit by learning how to encourage and support one another, as well as, how to actively listen to each other's viewpoints.

The SAGE questionnaire is a valuable tool to educators, for it can be used as a springboard for open communication with students. The SAGE questionnaire can be used to gauge the cooperative climate of the classroom, as well as, any conflicts among members that the teacher may not be aware of. For various reasons, students may be

reluctant to express their concerns and frustrations with their group members. The SAGE questionnaire provides a less intimidating forum for the student to express his or her views. For instance, student perceptions that their ideas are being belittled, or that others are benefiting unfairly from their efforts can be revealed and subsequently dealt with. Alleviating student conflicts is a must, especially in today's multicultural classrooms, where students come from various ethnic and cultural backgrounds.

The SAGE questionnaire can also provide important information on the effectiveness of small group learning as an instructional strategy, in a specific classroom. Teachers can evaluate their own philosophy, understanding, and efficacy with the cooperative learning or small group learning method. Student responses can reveal, for example, the need to change group membership or to redefine group roles and responsibilities. Educators may also discover that more content delivery is needed before students are prepared to share their understanding of the material with group members. As Hancock's (2004) research suggests, placing unprepared students in a group in order to master new content and to share their knowledge with their fellow group members, may lead to incomplete and faulty learning.

In conclusion, several strengths of the SAGE questionnaire include: First, it provides quick, convenient, and reliable information to teachers. The SAGE questionnaire, due to its comprehensive nature, captures a host of issues pertaining to small group learning. Second, student responses can reveal negative attitudes toward group members and group learning, thus, teachers can monitor group progress and intervene when groups encounter problems or become stagnant. Third, teachers can use the SAGE questionnaire as a pre-post measure to examine attitude change. For example,

do student attitudes become less positive over time? And if so, teachers can explore further to examine the causes. Finally, the SAGE questionnaire can be used in conjunction with other measures, such as student evaluations, classroom climate measures, and observation checklists, to capture a more complete picture of the cooperative learning environment.

Understanding areas of small group learning that students harbor negative attitudes toward may help educators implement cooperative activities that are productive and enjoyable for the students. Positive experiences may reduce the chance of interpersonal conflict within groups and create a more conducive learning environment. This will enable students to focus on the group task rather than interpersonal dynamics (Pfaff & Huddleston, 2003). The SAGE measure can be used as a catalyst for open dialogue with students, thus eliminating potential problems and reducing student frustration with small group learning. Kinchin (2004) states "establishing an effective dialogue between teacher and student should be a priority before implementing future innovations to ensure identification of the curriculum as experienced and as internalized, and subsequently achieve alignment with the needs of the consumers" (p.302). During an era of educational reforms being broadly implemented in classrooms, that are stressing active student learning, teachers need to hear and acknowledge the student voice, so that the new reforms are indeed beneficial to student learning.

Limitations

One of the goals of this research was to investigate if student attitudes toward working in cooperative small groups were related to academic achievement. One of the main limitations of this research was the adequacy of one of the components of this

research question. That is, the adequacy of the achievement data. The achievement data used in this study were student final grades in two biology courses. As stated previously, access to student grades was only allowed for the CEGEP students but not for the high school students. Therefore, achievement data were only collected on approximately 10% of the respondents (for 122 out of the 1066 students). In addition, the psychometric properties of the achievement data are not known, since the lab tests, unit tests and final exam were teacher made. No standardized achievement test was used. However, multiple questioning formats were used in evaluating content understanding, which is optimal when designing teacher- made tests, such as true-false, short answer, and multiple choice questions. Furthermore, an expert instructor evaluated the quality of the biology tests and deemed them to be valid measures.

Another limitation of this study was the definition of a cooperative small group. What is cooperative learning? An interesting observation that came out of this research experience is that very few educators (high school and college level) are using "pure" cooperative learning in their classrooms. Although participants (N = 1066) in this study came from three separate school boards and one college from Quebec, Canada, educators did not use a specific cooperative learning method in their classrooms. This was the case even though several high school principals stated that many of their teachers had received "some form" of training on cooperative learning in the past. This fact posed a major challenge in conducting a large scale study with a large sample size (which is mandatory to conduct factor analysis).

In order to develop a new and comprehensive instrument that is indeed reliable, valid, and useful to both educators and researchers, required the participation of many

respondents from various settings. This imposed a need to employ an all encompassing definition of small group learning. Defining what cooperative learning is and what it is not proved to be a challenging feat. While this was initially viewed as a challenge that was encountered only in this study, it soon became evident that other researchers have encountered a similar problem when conducting research in the cooperative learning classroom. Other researchers have also noted that the line of distinction between cooperative learning and regular group work is often blurred (Antil et al., 1998; Johnson et al., 2000). Abrami, Poulsen, and Chambers (2004) examined teacher self-reports of the quality of cooperative learning implementations and found that positive interdependence and individual accountability occurred in about half the classrooms. Furthermore, they found that expectancy of success was a critical factor in differentiating educators who implemented cooperative learning in their classrooms from those that did not. That is, teachers needed to believe that they had skills as educators, adequate training to implement cooperative learning successfully, and that their students had effective teamwork skills.

Researchers must take into consideration the subjective definitions of cooperative group work in the classrooms they are investigating, especially when they have no control over how students are assigned to groups, course content, group assignment, evaluation, length of time groups remain intact, etc. While this may not be an issue when studies are conducted in one's own classroom (i.e., the researcher is also the educator), the duration of the study is short, and conducted on a small sample size, it definitely complicates matters when the researcher has no control over the cooperative learning environment and teachers are using their own operational definitions. What is considered "cooperative learning" and how it is implemented in the classroom adds a complicating

element to the phenomena under investigation. Furthermore, the researcher encounters a paradoxical dilemma. While attempting to conduct a methodologically sound study, the researcher must also contend with issues that hinder access to participants, especially when students are observed and achievement data are requested. In order for permission to be granted by school board officials and from individual school governing boards the researcher must respect the conditions that are imposed.

Future Research

While the SAGE questionnaire was useful in conveying student attitudes towards several aspects of small group learning and in predicting student course grades, more research should be conducted in order to investigate the psychometric properties of the instrument. First and foremost, does the SAGE measure predict academic achievement when a standardized achievement test is used? In this study, final course grades that were comprised of five teacher made lab quizzes, two lab tests, two unit exams, and a final exam were used as the achievement measure. Secondly, achievement data should be collected on a larger sample of students, thus perhaps increasing the predictive ability of the SAGE measure. Once the predictive ability of the SAGE questionnaire is established, in terms of academic achievement, can responses from the SAGE questionnaire be used to predict other outcome measures such as student motivation to learn? Furthermore, it would be of future interest to examine the types of attitudes students have in classrooms where established cooperative learning methods are properly implemented such as Student Teams Achievement Divisions (STAD) or Teams-Games-Tournaments (TGT).

It would also be useful to examine how the SAGE questionnaire compares to other measures that may have been recently developed. Barry Fraser who is well known

in the field of learning environment research has developed several measures in including the Learning Environment Inventory (LEI) (Fraser, Anderson, & Walberg, 1982), My Class Inventory (MCI) (a simplified form of LEI for use among 8-12 year olds) (Fisher & Fraser, 1981), College and University Classroom Environment Inventory (CUCEI) (Fraser, Treagust, & Dennis, 1986), Science Learning Environment Inventory (SLEI) (Fraser, Giddings, & McRobbie, 1992), and Chemistry Laboratory Environment Inventory (CLEI) (Wong & Fraser, 1995).

Majeed, Fraser, and Aldridge (2001) modified the MCI for the Brunei context for their study. It was interesting that while they performed principal component factor analyses with varimax rotation, many of the items that loaded on the four factors were between 0.30 and 0.40. In addition, they claimed that internal consistency reliability (Cronbach alpha) for each scale as being high (0.50 to 0.63). They maintained that overall, factor and item analyses confirmed good reliability and validity for the refined version of the MCI assessing Cohesiveness, Difficulty and Competition. Quek, Wong, and Fraser (2002) examined the validity of the CLEI. A principal components factor analysis with varimax rotation was performed separately for the actual and preferred forms (students' responses to actual and preferred versions to the CLEI). Items that loaded 0.40 or higher were retained. Cronbach *alpha* coefficients ranged from 0.76 to 0.53 for the actual version, and from 0.86 to 0.69 for the preferred version. According to the results of their study they stated that the CLEI was a reliable and valid instrument for assessing perceptions of the actual and preferred chemistry laboratory classroom environment. It would be of interest to compare the SAGE questionnaire to other learning environment inventories that have been designed for the cooperative learning classroom.

A future direction for the SAGE instrument may be to modify it as a web-based assessment tool that can provide convenient access and information to both students and instructors. Some instruments used in cooperative/collaborative learning environments such as the Teamwork Assessment Scale (TAS) provide students and faculty with feedback on student's group performance and is intended to promote reflection and accountability (De Hoyos & Resta, 2005). The TAS focuses on self and peer assessment of the role of task management and social interaction contributions in the group functioning. Accessibility of an instrument is a key concern in making the measure easy to use in classroom research.

Finally, more small group observations should be conducted in classrooms where students work cooperatively in various contexts so that new dimensions can be added to the Student Attitudes toward Group Environment (SAGE) instrument. As most learning environment researchers realize, the measures developed are consistently refined and improved upon, with new items and factors included, thus improving the generalizability of the findings.

Observer's Personal Reflections/Recommendations

The findings of this study indicated that behavioural data has predictive power as well as descriptive ability in terms of capturing process data that can be used to explain why certain phenomena occurred or did not occur. While the goal was to record information that captured the essence of students working and learning together, there was also the added benefit of the researcher connecting with the participants in the study. This was especially the case when observations were carried out in the CEGEP biology

labs for the duration of a semester. In settings where only the SAGE questionnaire was administered the experience was more impersonal.

Conducting observations is a delicate balance of remaining invisible so that the interactions of the group members are not affected and establishing a connection so that the participants are not resentful of the fact that they are being observed. One way of achieving this is by conducting pilot observations. Although the goal of conducting pilot observations is more for increasing accuracy and reliability of the data, a byproduct is the establishment of a comfort level with the participants.

Before conducting observations in this study, the participants were made aware of the fact that: (a) they had the right to decline participation; (b) they could opt out of the study at any time if they did not feel comfortable once the observations began; (c) their grades would not be penalized based on their interaction and behaviours that were observed; (d) their teacher would not be privy to the recorded behavioural data so that they could behave the way they normally would; and (e) their names would not be divulged in any written report. While interaction with the participants was limited during the observations, attempts were made to talk to the students before and after the observations. That is, during the recording of the observations the students were told not to speak to the observers and to try to tune them out as much as possible. However, any questions or concerns they had could be addressed before or after the observations. Furthermore, before and after the observations the observers tried to socialize informally with the students as much as was possible. This way the students would feel less intimidated during the observation process. Students were also told that they could view the observation scheme only at the end of the study so that they did not consciously try to

alter their behaviours. Although every attempt was made to make the participants as comfortable as possible with the fact that they were going to be observed, initial observations are always a little awkward. Therefore, pilot observations are mandatory so that not only the participants, but the instructor of the class, as well as the observers can familiarize themselves with the observation procedures and thus making the situation less problematic as possible. The researcher should also be aware that in almost most cases there will always be one or two students that will prefer not to be observed and thus be ready to make modifications to the observation schedule, the group composition, etc. The researcher must also be conscious of the fact that problems are likely to occur that may affect the observation procedures during a particular visit. For example, technical failures or students from another lab joining the class thus changing the composition of the group, influence the amount of data that will be collected during that session.

While observations are being conducted the observer must try to keep focused on the purpose and procedures of the observations, and try to keep personal biases out of the data recording. Over time, certain group dynamics become evident. It becomes apparent which group member is stronger academically, which member is passive and tends to tune out, which member is consistently ignored by the other members, etc. That is, the observer should try to not infer behaviour but rather record what is actually viewed. For instance, an observer may be prone to record a behaviour as actively listening when the member is academically strong, and record the same behaviour as off-task (tuning out) when the member is not as academically strong or tends to be the "troublemaker" of the group. Personal biases must be kept in check so that the data will not be distorted. Therefore, for reliability purposes two observers should conduct the observations at all

times. Using two observers in the beginning of a study to establish reliability and then for each observer to conduct observations on their own in order to capture more data during a condensed period of time, is not suggested. Because of the nature of conducting observations, that is, intense focus, fast pace, coordination of mentally categorizing and recording information, and fatigue two observers are recommended.

While no method of data collection is without its inherent problems, observational data can provide a permanent record of student interactions and behaviours that otherwise would have been lost. Teachers can examine the types of behaviours that that students engage in and use this information to intervene when necessary. For example, if too many solitary on-task behaviours or putdowns are occurring then the teacher may need to implement some teambuilding activities that foster a bond among members and make the point that individuals often are more effective and efficient when they work cooperatively with others. Researchers, on the other hand, have descriptive data at their disposal that may illuminate issues that would not be explained if only attitudinal or achievement data is collected. While receiving permission to conduct observations in schools is a challenging endeavour and the data are time-consuming to collect and analyse, observational data add another dimension of understanding to the phenomenon that is being investigated.

Conclusion

In summary, by measuring student attitudes toward issues of small group learning that have not been previously examined (as evidenced by the SAGE questionnaire) and observing and capturing group behaviours that are necessary for effective group learning (as documented by the cooperative learning and group dynamics literature) insights were

provided that will ultimately strengthen the cooperative learning approach. Since cooperative skills are increasingly being viewed as being vital for success and productivity in and out of the educational milieu it is necessary to investigate issues that may hinder educators from implementing this pedagogical method in their classrooms. As Webb, Nemer, Chizhik, and Sugrue (1998) state, for workforce readiness, in addition to academic competence, students need interpersonal and teamwork skills, such as, coordination, communication, conflict resolution, decision making, problem solving, and negotiation. Learning cooperatively in classroom settings, students are given the opportunity to master skills that will serve them well in their personal and professional lives.

Student views and perceptions are important to consider when designing effective educational environments. Student attitudes play a large role in school success (Gentry et al., 2002). Furthermore, as researchers it is important to develop measures that inform us not only of the success of a pedagogical approach but also the reasons for the success. And sometimes, just as importantly, the reasons for lack of success in the classroom. The SAGE questionnaire provided valuable insights pertaining to how students view their cooperative experiences. In addition, the examination of how student attitudes influence student learning will ultimately be useful to researchers, school administrators, teachers, and researchers/ trainers of cooperative learning strategies. In an era where school reforms are presently being implemented that reflect a student-centered approach to learning, student perceptions provide invaluable information.

The results of this study provide a foundation for further investigation regarding student attitudes, behaviours, and student learning. By examining how student views

influence the effectiveness of cooperative learning strategies, improvements and enhancements may be made on group learning, content enjoyment, social relationships among peers, as well as student motivation to learn. Consequently, a theoretical framework can begin to be formulated so that a more systematic understanding of how student attitudes and behaviours influence student performance and achievement in the classroom. Further examination is warranted as to the degree in which student learning is affected in a cooperative environment.

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APPENDIX A

Key Concepts of Literature Review

Key Concepts of Literature Review

Attitudes

Definition:
- are based on beliefs or experiences
- there is a predisposition to act
- there is an affective quality
- evaluation is implied

Components:
- affective
- behavioural
- cognitive

Formation
- via social learning, classical conditioning, modeling, and direct experience

Change:
- some attempt of persuasion
- include attitude strength, importance, and stability

Relationship between Attitudes and Behaviours:
- attitudes guide, influence, direct, shape, or predict actual behaviour
- small but significant correlations

Cooperative Learning

Definition:
- a collection of instructional strategies that encourage students working in small groups to contribute their skills and abilities to achieve a group goal

Elements:
- positive interdependence
- individual accountability
- face-to-face promotive interaction
- interpersonal skills
- group processing

Research findings:
- students learn more
- find the content more enjoyable
- feel more competent as learners
- have more positive feelings towards their classmates and teachers

Interactive behaviours:
- help giving and help receiving
- simple information exchanges and elaborated explanations
- academic behaviours and social behaviours

Group Development

Stages:
-forming, storming, norming, performing, and adjourning (Tuckman, 1970's model)
-period of discontent, precipitating event, group identification, group productivity, individuation, and decay (Worchel et al., 1992)
-beginning, movement toward confrontation, compromise and harmony, reassessment, resolution, and recycling

Factors of effective group functioning:
- climate of cooperation
- open communication
- equal participation
- early detection of problems
- clear goals

APPENDIX B

Letter to Principals

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September 14, 1996

Dear Principal,

I am a Ph.D. candidate in the Humanities programme and a research assistant at the CSLP at Concordia University. I am interested in conducting a study in your school. My dissertation will investigate how student attitudes toward small group learning influence group behaviours and academic achievement.

Since cooperative and teamwork skills are increasingly being recognized as being necessary for academic and career success many educators are implementing cooperative learning or small group learning strategies in their classrooms. However, small group learning is not always a productive or enjoyable learning experience in the classroom. The goal of my study is to investigate why the positive research findings on cooperative learning are not manifesting themselves in actual classroom settings. Since important academic and social skills are learned when students work in groups it would be a shame for teachers to abandon this useful teaching strategy.

Therefore, if you allow me to conduct research in your school I would need access to high school students (grades 7-11) who have had some exposure to learning in groups. Students will fill out the SAGE questionnaire, which consists of 41 attitude statements. Students will be asked to indicate their responses on a five-point scale ranging from strongly agree to strongly disagree. This task should take less than thirty-minutes to complete.

If you allow me to collect data, you will be sent a package containing copies of the SAGE questionnaire, answer sheets, instructions to teachers on how to administer the questionnaire, parental consent forms, and student feedback forms. This way the teachers can administer the questionnaires themselves at a time that is convenient for them. Please let me know what procedures I need to follow in order to collect data in your school. I will be telephoning you shortly for your decision.

Sincerely,

Christina Kouros

APPENDIX C

SAGE Questionnaire Version 1

SAGE Student Attitudes toward Group Environments

This questionnaire is part of a study being conducted by the Centre for the Study of Classroom Processes, Concordia University in Montreal, Quebec, Canada. The purpose of this study is to assess student attitudes toward small group learning. We want to find out how you think, feel and behave when working with other students to learn.

The results from this research will be used to predict how student attitudes toward small group work influence student learning and motivation. Also, we expect information from this study will help teachers make small group learning a more productive and enjoyable experience.

Please be informed:
- This is **not a test**; there are no right or wrong answers.
- Your answers will be kept **confidential**.
- Your **teacher will not see your responses** to any of the questions.
- Your answers will **not affect your grades** in any way.
- You are **free to discontinue** at any time.

Please answer the items as honestly as possible. Your cooperation in completing this questionnaire is greatly appreciated. Thank you for your support.

Christina Kouros,
Ph.D. Candidate

Philip C. Abrami, Ph.D.
Professor & Director

Directions:

1. Please use an **HB** or **#2** pencil.

2. Place your answers on the special computer sheets. (Do not write on this questionnaire).

3. Make sure you fill in the circles on the answer sheet correctly. (Do not mark outside of the circles).

4. Make sure you put the answer for each item at the corresponding place on the answer sheet.

5. Fill in only one answer per question (i.e., do not fill in two circles).

6. Do not leave answers blank (if you are uncertain make your best guess).

7. If you change your answer, make sure that you erase your previous answer completely.

8. Please fill in the appropriate circle on the answer sheet for SEX and GRADE.

DEFINITION OF SMALL GROUP WORK

Small group work occurs when 2 to 6 students work together to learn new material, to review material, and to complete assignments and projects, which are part of a course.

Characteristics of small group work may include:

-asking each other questions,
-helping each other learn,
-taking on different roles (e.g., reporter, recorder, encourager, etc.)
-sharing resources (e.g., papers, calculators, etc.)
-receiving a grade based on their group work

Directions:

This questionnaire asks about your attitudes toward small group learning in this classroom. Use your experiences from this class to answer these statements.

Whenever there is a statement about group members, other students, etc., think of the students who have been in your group *in this class.* If you have been in several groups in this class, base your answers on the group that you *were in most recently.*

For each of the statements, fill in circle on the answer sheet that most closely corresponds to how you think and feel about the statement.

If you *strongly disagree* with the statement, fill in circle **a**; if you *disagree* with the statement, fill in **b;** if you *can not decide*, or feel in between, choose **c**; if you *agree* with the statement, fill in circle **d**; and if you *strongly agree* with the statement, fill in circle **e.**

Response Scale:

a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

Please note that all of the statements begin with the phrase *When I work in a group in this class.*

When I work in a group in this class,

1. I am able to share ideas.

2. the work is more fun.

3. it takes longer to complete the assignment.

4. I let the other students do all the work.

5. students learn better work habits.

6. I am forced to work with students I do not like.

7. I understand the material better.

Response Scale:
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

When I work in a group in this class,

8. everyone's ideas are needed if we are to be successful.

9. I can talk to my group members.

10. I get more work done in less time.

11. students like to help me learn.

12. there are opportunities to express your opinions.

13. we cannot complete the assignment unless everyone contributes.

14. I like working with students who understand the material.

15. we come up with more ideas.

16. I also learn when I teach other students.

17. I would rather work alone than argue with my group members.

18. friendships are made among group members.

19. I prefer to choose the students I work with.

20. students should work together to help each other learn.

21. there is the opportunity to pursue your interests.

22. I feel I am part of what is going on in the group.

Response Scale:
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

When I work in a group in this class,

23. it makes me want to find out more about the topic.

24. I am as important as any other student.

25. I learn new things.

26. stronger students have to work with weaker ones.

28. I want to work with my friends.

29. getting the work done is important to us.

30. it bothers me if I have to do more work than the other students.

31. our job is not done until everyone is finished.

32. I do not get my work done because I socialize with my group members.

33. a lot of friendships are made.

34. students respect the opinions of the other members.

35. if I do not understand the other members can explain it to me.

36. students help each other learn.

37. I learn to work with different types of people.

38. I do better work alone.

39. group members do favors for one another.

Response Scale:
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

When I work in a group in this class,

40. students learn to work with others.

41. I like talking with my classmates.

APPENDIX D

Parental Consent Form

Parental Consent Form

There is growing interest in small group learning and its benefits in the classroom. Many studies have shown that students who work in cooperative classrooms learn more, find the content more enjoyable, feel more competent as learners, and have more positive feelings towards their teachers and classmates.

During Fall 1996 a doctoral student will be conducting a study examining student attitudes toward small group learning and group behaviours. We request that your son/daughter participate in this study. The purpose of the study is to examine the reliability and validity of the Student Attitudes toward Group Environments (SAGE) questionnaire that captures a wide range of aspects of small group learning. The information from this instrument will be used to improve student learning in groups and, particularly, in the implementation of cooperative learning in classrooms. We hope that the results will help to make your child's schooling more effective and enjoyable.

Your consent is requested to allow your son/daughter to fill out the SAGE questionnaire. Your child will be asked to respond to 41 items pertaining to small group work (e.g., When I learn in a small group I am able to share my ideas). This task will take no longer than a half hour and will be supervised by the teacher of each class.

-Your child will not be asked to provide his/her name.
-Your child's responses to the questionnaire will be treated confidentially.
-You and your child are free to withdraw consent to the data collection at any time.
- In acknowledgement of the school's participation, a summary of the findings will be made available. However, responses of individual students will not be disclosed.

If you have any questions concerning the study, please feel free to contact the Director of the Centre, Dr. Philip. C. Abrami or Christina Kouros, Ph.D. candidate at 1-(514)-848-2020, or write to: Centre for the Study of Classroom Processes, LB 581, 1455 De Maisonneuve, West, Montreal, Quebec H3G 1M8.

Please fill in the information below and return it to the teacher.

____ I have read the above information and I understand this agreement, and therefore I freely consent and agree to allow my child to participate in the study.

____ I have read the above information and I understand this agreement, and therefore I do not allow my child to participate in this study.

NAME OF CHILD (please print)_____
SIGNATURE OF PARENT_____
DATE_____

APPENDIX E

Data Collection Instructions for Teachers

Data Collection Instructions for Teachers

Materials:

1. Your principal will give you copies of the SAGE questionnaire and answer sheets (as many as needed per class).

2. Your principal will also give you pink parental consent forms that should be signed before data collection begins. Inform your students that the parental consent form should be signed by a parent/guardian and returned to you in 2 days. Once the signed consent forms are returned to you, place them in the envelop provided (e.g., Parental Consent Forms Teacher #X) and return the envelop to your principal.

Data collection instructions:

1. Administer the SAGE questionnaire at a time that is convenient for you. Ideally all students from the other classes should fill out the questionnaire during the same week.
2. In order to minimize classroom management issues, it would be ideal if each student in the class filled out the questionnaire. That is, while most of the students in the class are filling out the questionnaire, some students may be working on their homework, or may be off-task and disruptive. This may frustrate some students because they have to fill out the questionnaire and others do not.

Administering the SAGE questionnaire:

1. Please read page 1 and page 2 out loud to your students.
2. Please go over the response scale on page 3 with your students.
3. Ask your students to write their names on their answer sheet and to fill out the appropriate circles (their names are needed in order to compare their responses to the questionnaire at a later date).
4. Once the students have completed the SAGE questionnaire you will collect the questionnaires and answer sheets and return them to your principal.
5. Please do not hesitate to call me at (514) 848-2020 or e-mail me at ckouros@alcor.concordia.ca if you have any questions.

APPENDIX F

Student Comment Sheet

Student Comment Sheet

Please take a few moments to give us your personal opinions and feedback concerning this questionnaire. We appreciate the time and effort you are devoting to this.

Did you have problems answering this questionnaire? If so, why?

Did you have problems answering some questions? If so, which ones? For example, # 17 because I found it difficult to understand, etc.

Please give us your overall opinions and comments concerning this questionnaire or anything else you would like to add.

APPENDIX G

The Seven Factors of the SAGE Questionnaire

The Seven Factors of the SAGE Questionnaire

Factor 1: Support: Items on this factor pertain to the academic and personal support students give and receive when working in groups. The degree of student support as expressed by helping each other with the work, feeling involved and developing friendships with group members and respecting each other's opinions.
Example of an item that loads on this factor: *I feel I am part of what is going on in the group.*

Factor 2: Work Overload*: Work overload is the extent that the material becomes less enjoyable, comprehension is reduced, and the length of time to complete the assignment is increased when working with other students.
Example: *It takes longer to complete the assignment when I work with others.*

Factor 3: Desiring Compatibility: Compatibility is the extent to which students desire compatibility with their group members, as expressed by students wanting to work with friends, prefer choosing their group members, and like talking with their group members.
Example: *I prefer to choose the students I work with.*

Factor 4: Accepting Diversity: The degree students are open to work with group members of varying academic ability, who have different opinions, are different types of people, and feel they are learning when they teach others.
Example: *I like working with students who understand the material.*

Factor 5: Valuing Cooperation: The degree to which students should help each other learn, feel that they learn new things by cooperating, and resent doing more work than other group members.
Example: *It bothers me if I have to do more work than other students.* *

Factor 6: Involvement: The extent to which students are involved in the group process and the group product, as expressed by sharing ideas, contributing equally, feeling as important as other students, and learning better work habits when working with classmates.
Example: *I am able to share my ideas in a group.*

Factor 7: Nonsupportive Interaction*: The degree that students do not have the opportunity to talk to their group members and are expected to work with students that they do not like.
Example: *I am forced to work with students that I do not like.* *

Note: Items and factors with an asterisk (*) are negatively phrased: higher scores indicate less favourable attitudes toward learning in small groups.

APPENDIX H

SAGE Questionnaire Final Version

School:_____
Student Name/ID number:_____
Date:_____

SAGE
Student Attitudes toward Group Environments

This questionnaire is part of a study being conducted by the Centre for the Study of Learning and Performance, Concordia University in Montreal, Quebec, Canada. The purpose of this study is to assess student attitudes toward small group learning. We want to find out how you think, feel and behave when working with other students to learn.

The results from this research will be used to predict how student attitudes toward small group work influence student learning and motivation. Also, we expect information from this study will help teachers make small group learning a more productive and enjoyable experience.

Please be informed:
- This is **not a test**; there are no right or wrong answers.
- Your answers will be kept **confidential**.
- Your **teacher will not see your responses** to any of the questions.
- Your answers will **not affect your grades** in any way.
- You are **free to discontinue** at any time.

Please answer the items as honestly as possible. Your cooperation in completing this questionnaire is greatly appreciated. Thank you for your support.

Instructions

-Please use a pencil to fill out the questionnaire.
-Write your name/Id number and date on the questionnaire. If there are numbers on the line that states Student name/Id number **do not write your name.**
-Place your answers directly on this questionnaire.
-Fill in only one answer per question (i.e., do not circle two answers).
-Do not leave answers blank (if you are uncertain make your best guess).
-If you change your answer, please erase your previous answer completely.

Directions:

This questionnaire asks about your attitudes toward small group learning in this classroom. Use your experiences from this class to answer these statements.

Whenever there is a statement about group members, other students, etc., think of the students who have been in your group *in this class.* If you have been in several groups in this class, base your answers on the group that you *were in most recently.*

For each of the statements, circle the answer that most closely corresponds to how you think and feel about the statement.

Response Scale:

a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

If you *strongly disagree* with the statement, circle **a**; if you *disagree* with the statement, circle **b**; if you *can not decide*, or feel in between, choose **c**; if you *agree* with the statement, circle **d;** and if you *strongly agree* with the statement, circle **e**.

1. When I work in a group I do better quality work.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

2. When I work in a group I end up doing most of the work.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

3.When I work with other students I am able to work at my own pace.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

4. When I work in a group I want to be with my friends.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

5. The work takes longer to complete when I work with other students.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

6. My group members do not respect my opinions.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

7. I enjoy the material more when I work with other students.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

8. My group members help explain things that I do not understand.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

9. I become friends with my group members.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

10. When I work in a group I am able to share my ideas.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

11. My group members make me feel that I am not as smart as they are.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

12. The material is easier to understand when I work with other students.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

13. My work is better organized when I am in a group.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

14. My group members like to help me learn the material.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

15. My group members get a good grade even if they do not do much work.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

16. The workload is usually less when I work with other students.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

17. I feel I am part of what is going on in the group.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

18. One student usually makes the decisions in the group.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

19. Our job is not done until everyone has finished the assignment.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

20. I find it hard to express my thoughts when I work in a group.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

21. I do not think a group grade is fair.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

22. I try to make sure my group members learn the material.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

23. My grade depends on how much we all learn.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

24. It is difficult to get together outside of class.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

25. I learn to work with students who are different from me.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

26. My group members do not care about my feelings.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

27. I do not like the students I am assigned to work with.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

28. I let the other students do most of the work.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

29. I get to know my group members well.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

30. I feel working in groups is a waste of time.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

31. When I work in a group I get the grade I deserve.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

32. My group members do not like me.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

33. I have to work with students who are not as smart as I am.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

34. When I work in a group, there are opportunities to express your opinions.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

35. When I work with other students the work is divided equally.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

36. We cannot complete the assignment unless everyone contributes.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

37. My marks improve when I work with other students.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

38. I help my group members with what I am good at.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

39.My group members compete to see who does better work.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

40. The material is more interesting when I work with other students.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

41. When I work in a group my work habits improve.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

42. I like to help my group members learn the material.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

43. Some group members forget to do the work.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

44. I do not care if my group members get good grades.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

45. It is important to me that my group gets the work done on time.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

46. I am forced to work with students I do not like.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

47. I learn more information when I work with other students.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

48. It takes less time to complete the assignment when I work with others.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

49. I also learn when I teach the material to my group members.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

50. I become frustrated when my group members do not understand the material.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

51. When I work in a group I get the grade I deserve.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

52. Everyone's ideas are needed if we are going to be successful.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

53. When I work with other students we spend too much time talking about other things.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

54. I prefer to choose the students I work with.
a) Strongly Disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly Agree

55. Your sex.
a) Male
b) Female

56. Grade you are presently in.
a) 7- 8
b) 9-10
c) 11
d) CEGEP 1st year
e) CEGEP 2nd year

57. Subject you learn in this class.
a) Languages (English, French, etc.)
b) Mathematics and Science
c) Social Studies (History, Geography, etc.)
d) Computers and Technology
e) Other

58. Average grade you expect this year (taking all your classes into consideration).

a) 90-99
b) 80-89
c) 70-79
d) 60-69
e) 59 and below

59. Average grade you received last year (taking all your classes into consideration).

a) 90-99
b) 80-89
c) 70-79
d) 60-69
e) 59 and below

APPENDIX I

Summary Protocol Long Form

Summary Protocol Long Form

1. Title of Research Project

Ph.D. dissertation
Title: Examining the complex dynamics of learning in cooperative small groups: The relationship between student attitudes, group behaviours, and academic achievement

2. Sample of persons to be studied:

Male and female high school students (grades 7-11) and CEGEP students who are exposed to various forms of small group learning strategies.

3. Method of recruitment of participants:

Schools and teachers will be approached that are: (a) using small group learning in their classrooms; and (b) willing to have a researcher in their classroom observing and recording group behaviours exhibited by students.

4. Treatment of participants in the course of the research:

The purpose of this program of research is to garner a better understanding of small group learning via two data sources; an instrument assessing student attitudes toward small group learning (SAGE) questionnaire and an observation instrument capturing productive and counterproductive group behaviours and interactions.

Therefore, students will be: (a) asked to fill out the SAGE questionnaire, which consists of 54 attitude statements (e.g., strongly agree to strongly disagree) twice, once in the beginning of the study and again at the end of the study (6 weeks later). This task should take less than thirty-minutes to complete; and (b) observed as they work in small groups so that their behaviours can be recorded on an observation scheme. Finally, access to student grades will be needed in order to examine the impact of student attitudes on actual performance.

5. Indicate briefly how the research plan deals with the following potentials concerns:

(a) Informed consent:

See student consent form attached. Parental consent form is also attached.

(b) Deception:

None

(c) Freedom to discontinue:

Participants are free to discontinue at any time. They will be told this in writing as well as verbally during initial meetings.

(d) Risk to subjects' physical or psychological welfare:

None

(e) Post-research explanation and/or debriefing:

At the end of the study students will be debriefed about the study and will be shown the observation scheme (i.e., behaviours that were recorded during group work).

(f) Confidentiality of results:

Individual results will be treated confidentially by assigning identification numbers to responses. The names of the schools and participants will not be divulged in any research report of the findings.

(g) Protecting and/or addressing participant "at risk" situations:

Not applicable

(h) Comment on any other ethical concerns which may arise in the course of the research:

Not applicable

(i) Please comment on expected benefits to be derived from this research:

The goals of this program of research are fourfold: First, to further understand the nature and structure of student attitudes toward cooperative learning and other forms of learning in small groups. Second, to examine the relationship between student attitudes on the SAGE questionnaire and academic achievement. Third, to examine the relationship between student attitudes on the SAGE questionnaire and student behaviours exhibited during group work. Finally, to investigate the types of behaviours that occur during small group work. That is, the proportion of time spent on productive group behaviours than on counterproductive behaviours.

The SAGE instrument can be used as: (1) a diagnostic measure to help identify areas in which students have strong positive and negative attitudes toward learning in small groups; (2) a guide for developing, modifying and implementing small group learning strategies effectively; (3) a pre-post attitude measure in which attitude change can be measured; (4) a predictive measure in which academic achievement and other learning

outcomes can be surmised; and (5) an evaluation tool to assess the degree of effectiveness and success of the small group learning approach.

APPENDIX J

Student Consent Form

Student Consent Form

There is a growing interest in small group learning and its benefits in the classroom. Many studies have shown that students who work in cooperative classrooms learn more, find the content more enjoyable, feel more competent as learners, and have more positive feelings towards their teachers and classmates.

During Spring 2000 a doctoral student will be conducting a study examining student attitudes toward small group learning and group behaviours. Your participation in this study is requested.

The purpose of the study is to examine the reliability and validity of the Student Attitudes toward Group Environments (SAGE) questionnaire that captures a wide range of aspects of small group learning. The information from this instrument will be used to improve student learning in groups and, particularly, in the implementation of cooperative learning in classrooms. We hope that the results will help to make your schooling more effective and enjoyable.

Your consent is requested to:

(a)fill out the SAGE questionnaire. You will be asked to respond to 54 items pertaining to small group work (e.g., When I learn in a small group I am able to share my ideas) and 5 background questions. This task will take no longer than a half hour to complete.

(b)be part of a group that will be observed in order to investigate the types of behaviours that occur during group work.

(c)allow access to your grades in this course.

-Your responses to the questionnaire will be treated confidentially.
-You are free to withdraw consent to the data collection at any time.
- In acknowledgement of the school's participation, a summary of the findings will be made available. However, responses of individual students will not be disclosed.

If you have any questions concerning the study, please feel free to contact the Director of the Centre, Dr. Philip. C. Abrami or Christina Kouros, Ph.D. candidate at 1-(514)-848-2020, ckouros@alcor.concordia.ca or write to: Centre for the Study of Learning and Performance, LB 581, 1455 De Maisonneuve, West, Montreal, Quebec H3G 1M8.

Please fill in the information below and return it to the teacher.

____ I have read the above information and I understand this agreement, and therefore I freely consent to participate in this study.

____ I have read the above information and I understand this agreement, and therefore I do not want to participate in this study.

NAME (please print)_____

SIGNATURE _____

DATE_____

SCHOOL_____

APPENDIX K

Agreement Matrix

	QS	QT	GI	RI	GE	RE	GP	EV	LI	ON	HA	EN	PD	WD	OF	RD	CH	JK	Mis.	Tot.
QS	III																			3
QT		III																		3
GI			I																	1
RI				II		I														2
GE			I		III															3
RE						I														1
GP																				0
EV																				0
LI									II											2
ON										III										3
HA																				0
EN																				0
PD																				0
WD																				0
OF									I						II					2
RD																III				3
CH																				0
JK																		I		1
Mis																				0
Tot.	3	3	1	2	3	1	0	0	2	3	0	0	0	0	2	3	0	1	0	24

Formula: $K=\frac{Po-Pc}{1-Pc}$

APPENDIX L

Operational Definitions of Observational Categories

Task behaviours:

Asks for help: QS, Is asked for help QT
Request for a solution to a procedural or content-based problem when the student does not know the answer (e.g., can you help me?).

Giving elaboration GE
Supplying the details of how to solve the problem and providing information that enhances understanding by either elaborating on answer or process (e.g., First, you multiply these two numbers then you...).

Receiving elaboration RE
Obtaining pertinent information that clarifies understanding on process and procedures. Detailed information is provided instead of a short answer (e.g., we have to do it this way because...).

Giving information or opinions (without elaboration) GI
Supplying brief answers and information in order to terminate the question or interaction. There is no elaboration or detailed information provided (e.g., the answer is 514).

Receiving information or opinions (without elaboration) RI
Obtaining short and brief answers and information without further details or explanation (e.g., I think this is the way to do it).

Checking understanding CH
Information is exchanged that is used to check one's own understanding as well as the other group members (e.g., this is a drupe. Right?).

Group procedure information GP
Asking or informing the members how the group will proceed. That is, setting goals, dividing the task, assigning roles, etc. This category taps information pertaining to group functioning and not information pertaining to the content or task.

Progress and evaluation EV
Questions, comments, and suggestions that deal with how well the members achieved their goals and functioned efficiently and productively (e.g., Great, we finished on time!).

Actively listening LI
Third party actively paying attention or listening to an interaction (e.g., target student listens to the discussion that other members are having).

On-task: (non-verbal) ON
Non-verbal on-task activity (e.g., writing information on a work stencil).

Reading text RD
Student silently reads book, class notes, or course manual. This behaviour occurs frequently during group work and describes what is going on (other than on-task).

Maintenance or social behaviours:

Harmonizing HA
Making attempts to alleviate or eliminate tensions or conflict between group members (e.g., John did not mean to say that).

Encouraging EN
Encouraging others to participate, agreeing with comments, and giving praise. Positive and directed comments can be directed to other students (e.g., That's a good idea!).

Joking JK
Teasing, laughing, and poking fun at the task and at each other. Members do not take offence to the comments (e.g., Your drawing looks goofy!).

Self-oriented behaviours:

Off-task (verbal and non-verbal) OF
Off-task behaviours can occur alone or in groups. Includes off-task discussions, fooling around with objects or one another (e.g., discussing a television show or playing with a pen).

Put-downs (toward a group member or group learning) PD
Discouraging others by disagreeing inappropriately with their comments, ridiculing their answers, refusal to provide assistance or acknowledge participation, discouraging participation by negative comments or interruptions (e.g., You have no idea what you are talking about).

Withdrawing WD
Emotionally tuning out and deliberately ceasing to participate or talking to other group members (e.g., staring out the window for a long period of time).

APPENDIX M

Observation Scheme

Date:_____
School:_____
Student Name/ID:_____
Student Name/ID:_____
Student Name/ID:_____
Student Name/ID:_____

Asks for help **QS**	Is asked for help **QT**	Checking Understanding **CH**
Giving Information **GI**	Receiving Information **RI**	Giving Elaboration **GE**
Receiving Elaboration **RE**	Group Procedures **GP**	Evaluation **EV**
Actively Listening **LI**	On-task (non-verbal) **ON**	Harmonizer **HA**
Encourages **EN**	Reading **RD**	Off-task (verbal/nonverbal) **OF**
Put-downs **PD**	Withdrawing **WD**	Joking **JK**

Time	**Student**	**Behaviours**
1	1	GI, RI, ON, GE
2	2	ON, ON, GI
3	3	LI
4	4	RE, GE
5	1	Etc.
6	2	
7	3	
8	4	
9	1	
10	2	
11	3	
12	4	

APPENDIX N

Expert Ratings of Biology Achievement Tests

CRITERIA	FINAL EXAM	UNIT TEST 1	UNIT TEST 2	LAB TESTS
COVERED CONTENT 1. biased coverage 2. some content missing 3. average coverage of content 4. very good coverage of content 5. excellent coverage of content	5	5	5	5
QUALITY OF QUESTIONS 1 poor quality 2. average quality 3. good quality 4. very good quality 5. excellent	5	5	5	5
DIFFICULTY OF QUESTIONS 1. is too easy 2. is somewhat easy 3. is average difficulty 4. is somewhat difficult 5. very difficult	3	5	4	4
PERCENT QUESTIONS AT RECALL LEVEL	20%	5%	10%	0
PERCENT QUESTIONS AT HIGHER LEVEL	80%	95%	90%	100%

APPENDIX O

The Nine Factors of the SAGE Questionnaire

The Nine Factors of the SAGE Questionnaire

Factor 1: Academic Support: Items on this factor pertain to the perceived academic benefits of working with other students, as expressed by the quality of work produced, ease and enjoyment of material, liking to help others, and more improved learning.

Items:

1. When I work in a group, I do better quality work.
7. I enjoy the material more when I work with other students.
8. My group members help explain things that I do not understand.
12. The material is easier to understand when I work with other students.
13. My work is better organized when I work in a group.
14. My group members like to help me learn the material.
22. I try to make sure my group members learn the material.
30. I feel working in groups is a waste of time.
37. My marks improve when I work with other students.
38. I help my group members with what I am good at.
40. The material is more interesting when I work with other students.
41. When I work in a group my work habits improve.
42. I like to help my group members learn the material.
47. I learn more information when I work with other students.
49. I also learn when I teach the material to my group members.

Factor 2: Peer Support: Items on this factor pertain to the personal support students give and receive when working in groups. The degree of student support as expressed by respecting each others' opinions, feeling liked and involved with the group activities, and feeling valued as group members.

Items:

6. My group members do not respect my opinions.
10. When I work in a group I am able to share my ideas.
11. My group members make me feel that I am not as smart as they are.
17. I feel I am part of what is going on in the group.
20. I find it hard to express my thoughts when I work in a group.
26. My group members do not care about my feelings.
32. My group members do not like me.
34. When I work in a group, there are opportunities to express your opinions.

Factor 3: Contribution: The degree to which students contribute to the group process and product, there is equal participation, and evaluation depends on the grades of other members.

Items:
19. Our job is not done until everyone has finished the assignment.
23. My grade depends on how much we all learn.
28. I let the other students do most of the work.
36. We cannot complete the assignment unless everyone contributes.
44. I do not care if my group members get good grades.
45. It is important to me that my group gets the work done on time.
52. Everyone's ideas are needed if we are going to be successful.

Factor 4: Disliking Members: Items pertain to disliking the assigned group members and feelings of frustration when working with less academically competent members.

Items:
27. I do not like the students I am assigned to work with.
33. I have to work with students who are not as smart as I am.
46. I am forced to work with students I do not like.
50. I become frustrated when my group members do not understand the material.

Factor 5: Work Division: The degree that students feel that the work is divided equally and that no one takes advantage of the group members.

Items:
2. When I work in a group I end up doing most of the work.
15. My group members get a good grade even if they do not do much work.
16. The workload is usually less when I work with other students.
35. When I work with other students the work is divided equally.

Factor 6: Relying on Members: Items pertain to relying on other students to do the work, fairness of group evaluation, and being able to work at one's own pace.

Items:
3. When I work with other students I am able to work at my own pace.
24. It is difficult to get together outside of class.
43. Some members forget to do the work.
53. When I work with other students, we spend too much time talking about other things.

Factor 7: Time: Items pertain to the length of time it takes to complete assignments when working in groups.

Items:
5. The work takes longer to complete when I work with other students.
48. It takes less time to complete the assignment when I work with others.

Factor 8: Wanting to Work with Friends: The degree to which students want control as to the group members assigned to work with.

Items:
4. When I work in a group I want to be with my friends.
54. I prefer to choose the students I work with.

Factor 9: Cohesion: The extent that students feel close to their members and feel that friendships emerge from group learning.

Items:
9. I become friends with my group members.
29. I get to know my group members well.

APPENDIX P

The Four Factors of the SAGE Questionnaire

The Four Factors of the SAGE Questionnaire

Factor 1 Quality of Product and Process: Items on this factor pertain to the perceived academic benefits of working with other students as expressed by: (a) the quality of work produced; (b) ease and enjoyment of the material; (c) liking to help others; and (d) more productive learning.

Items:

1. When I work in a group, I do better quality work.
5. The work takes longer to complete when I work with other students.
7. I enjoy the material more when I work with other students.
8. My group members help explain things that I do not understand.
12. The material is easier to understand when I work with other students.
13. My work is better organized when I work in a group.
14. My group members like to help me learn the material.
16. The workload is usually less when I work with other students.
30. I feel working in groups is a waste of time.
31. When I work in a group I get the grade I deserve.
37. My marks improve when I work with other students.
40. The material is more interesting when I work with other students.
41. When I work in a group my work habits improve.
47. I learn more information when I work with other students.
48. It takes less time to complete the assignment when I work with others.

Factor 2: Peer Support: Items on this factor pertain to degree of perceived peer support as expressed by: (a) respecting each other's opinions; (b) feeling liked; (c) feeling involved with the group activities; and (d) feeling valued.

Items:

6. My group members do not respect my opinions.
10. When I work in a group I am able to share my ideas.
11. My group members make me feel that I am not as smart as they are.
17. I feel I am part of what is going on in the group.
20. I find it hard to express my thoughts when I work in a group.
26. My group members do not care about my feelings.
32. My group members do not like me.
34. When I work in a group, there are opportunities to express your opinions.

Factor 3: Student Interdependence: The degree to which students: (a) care for each other's learning; (b) contribute fully to the group experience; (c) feel there is equal participation; and (d) feel that evaluation depends on the performance of the other members.

Items:

9. I become friends with my group members.
19. Our job is not done until everyone has finished the assignment.
23. My grade depends on how much we all learn.
25. I learn to work with students who are different from me.
28. I let the other students do most of the work.
29. I get to know my group members well.
36. We cannot complete the assignment unless everyone contributes.
38. I help my group members with what I am good at.
44. I do not care if my group members get good grades.
45. It is important to me that my group gets the work done in time.
49. I also learn when I teach the material.
52. Everyone's ideas are needed if we are going to be successful.

Factor 4: Frustrations with Group members: Items pertain to feelings of: (a) frustration when working with less academically competent members; (b) disliking the assigned group members; (c) becoming off- task due to socializing; and (d) wanting choice as to the students assigned to work with.

Items:

4. When I work in a group I want to be with my friends.
27. I do not like the students I am assigned to work with.
33. I have to work with students who are not as smart as I am.
43. Some group members forget to do the work.
46. I am forced to work with students I do not like.
50. I become frustrated when my group members do not understand the material.
53. When I work with other students we spend too much time talking about other things.
54. I prefer to choose the students I work with.

APPENDIX Q

Justifications for Factor Analysis Procedures

Varimax rotation (orthogonal method) was used instead of oblique rotation (non-orthogonal method) for the following reasons: (a) when oblimin rotation was requested in SPSS a structure matrix was not computed because rotation failed to converge in 25 iterations. Changing the SPSS default option in order to increase the number of iterations did not solve this problem; (b) oblique rotation is not commonly used because although it makes linkages of the variables with the factors clearer, it makes the distinction between factors more difficult; (c) oblique rotation is used more often in confirmatory factor analysis and the purpose of the factor analysis was exploratory in this study; and (d) although it may be unreasonable to assume that any set of psychological variables are truly uncorrelated (Reise, Waller, & Comrey, 2000) the goal was to establish factors from the SAGE questionnaire that were as distinct as possible.

It is of interest to note that principal axis factoring was also considered as a means of extracting factors from the data set. Principal axis factoring also called principal factor analysis, tries to find the least number of factors that can account for the common variance of a set of variables, whereas principal components analysis accounts for the common variance as well as the unique variance in a set of variables (Weinberg & Abramowitz, 2002). With principal axis factoring nine factors were extracted with 54.33% of the variance explained. However, since the first factor accounts for the bulk of the common variance, the loadings were not as high on the remaining extracted factors. That is, factors 6-9 each had only two items with loadings of .4 or higher. When a 4-factor solution was requested the 53 items loaded on the same factors as they did with principal components analysis. The only distinction was the size of the factor loadings, principal components analysis yielded larger factor loadings. That is, the highest loading

item on Factor 1 was .84 with principal components analysis and .83 with principal axis factoring. Similarly, the highest loading item on Factor 2 was .68 instead of .64; Factor 3 was .59 instead of .55; Factor 4 was .52 instead of .47. Therefore, due to the identical factor structure and lower factor loadings, principal axis factoring was not selected over principal components analysis.

Furthermore, it has been reported that when the communalities are 1.0, the principal component, axis, minimum residual, alpha, and maximum likelihood solutions are practically identical (Gorsuch, 1983). In addition, as the number of variables increase, communality estimates and the method by which exploratory factors are extracted become less important. The general conclusion is that when the number of variables is moderately large, for example, greater than 30, and the analysis contains virtually no variables expected to have low communalities (e.g., .4), practically any of the exploratory procedures other than the diagonal or multiple-group analysis will lead to the same interpretations. The investigator can therefore select the procedure that is readily available (Gorsuch, p.123).

As a side note, four factors were also requested to be extracted using an oblique rotation method (oblimin) rather than an orthogonal rotation (varimax). Since four factors were requested to be extracted, the SPSS program was able to generate a structure matrix with the factor loadings for the 53 items (all items except item 51were included). This analysis was performed in order to compare the factor structures produced by both methods. Surprisingly, the factor structure produced via an oblique rotation was not that different from the one produced via an orthogonal rotation. That is, the 15 items that loaded on Factor 1 via varimax rotation also loaded together via an oblimin rotation.

However, 3 additional items also loaded on factor 1 via an oblimin rotation that did not make conceptual sense with the essence of the factor. These were: item 21, "I do not think a group grade is fair" (loaded on factor 4 via varimax rotation); item 35, "When I work with other students the work is divided equally" (loaded on factor 4 via varimax rotation); and item 42, "I like to help my group members learn the material" (loaded on factor 3 via varimax rotation). The only other item that did not match the factor structure created via varimax rotation was item 18, "One student usually makes the decisions in the group" that loaded on factor 4 via varimax and on factor 2 via an oblimin rotation. These items (items 18, 21, 35, and 42) loaded on more than one factor with a varimax rotation. This supports the decision to eliminate these four problematic items from the SAGE questionnaire based on the results of the factor analysis using an orthogonal rotation Fromage