

**INDIVIDUALISED MATHEMATICS  
INSTRUCTION WITH RURAL  
ACADEMIC STUDENTS**

**SIDNEY H. MORRELL**

B.Sc., McGill University, 1978  
Ed. Dip., McGill University, 1979

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## **Dedication**

This is dedicated to my supervisor Dr. Richard Butt for enabling me to rediscover the thrill of teaching, to the world's greatest brother Robert D. Morrell, and to Leanne G. Smith for her support during unsettling times.

## **Abstract**

The British Columbia Royal Commission on Education (1988) submitted to the government of the day a number of recommended changes to the educational system. The Commission considered these changes necessary for a person to be a contributing member of society in the next century. Most of the Commission's recommendations were accepted and have been the foundation for all subsequent policy directives. The restructuring of the educational system as indicated by the policies of the Department of Education appears to be headed towards a self paced curriculum. At the very least it will no longer be group paced because students learn at different rates. One way to achieve this would be through individualised instruction. This project developed modules for the delivery of the grade ten trigonometry unit based upon this mode of instruction. The modules incorporated guided instruction in the form of guided examples as a means of ensuring student understanding. Six students, four females and two males, were interviewed about their experiences with the modules. Student initial attitudes to the modules were somewhat negative due to previous student experiences with early versions of the modules. Student attitudes rapidly changed to a positive reaction as they worked their way through the revised and final version of the modules. Further analysis of the interviews indicates that the mode

of instruction had positive affects on self esteem. It also suggests that the mode of instruction tends to lead students into choosing their learning environment and peer tutoring. Though all the students indicate that the guided instruction modules prepared them for the exercises the students did not perform well on summative evaluations. The project does suggest that the failure of this mode of instruction to successfully convey the necessary concepts, as measured by designed evaluations, may stem from the students lacking the skills necessary for this mode of instruction; skills such as questioning oneself, looking for connections between concepts and self-motivation among others.

## Preface

The Sullivan Royal Commission on Education in 1988 made a number of recommendations for changes in education. These recommended changes were seen as necessary by the Commission to prepare students for the next century. Since 1988 the directions of the Department of Education has been focused upon those recommendations accepted by the government of the day. Although the government has since changed, the fundamental principles of the reform remain intact. Such basic principles as *every learner can learn* and anecdotal report cards can be found in recent policy directives. Included in the present policies is the concept that continuous progress will be an essential part of the new structure for schools. This concept will probably prescribe teachers to change the manner in which their courses are structured. The changes that will occur throughout the province will vary. One possible change may involve individualising present programs.

The purpose of this project was to develop a set of individualised instruction modules based upon the trigonometry unit in grade ten mathematics. The completed individualised materials was given to a group of students to work through in any manner they so desire, whether that be alone or in groups. At the end of the implementation, six students was requested to participate in interviews about their experiences. It was hoped that this process

would achieve three outcomes. First, it would provide some insight for teachers contemplating this mode of instruction. Second, it would produce an individualised unit for grade 10 mathematics. Third, it would document the students' experiences and opinions of this mode of instruction.

## Table of Contents

	Page
Dedication .....	iii
Abstract .....	iv
Preface .....	vi
Curriculum Reform .....	1
Method .....	7
Background .....	7
Materials .....	9
Location .....	10
Time Line .....	10
Students .....	10
Interviews.....	11
Analysis .....	12
Development of modules .....	12
Utilising the modules .....	15
Learning environment .....	15
Perception of learning .....	18
Reflection upon modules .....	21
Conclusion .....	24
References .....	30
Appendix A: Trigonometry 10 Module .....	32
Appendix B: Interview Questions .....	40
Appendix C: Transcription of Interviews	
Female Students .....	41
Male Students .....	77

## Curriculum Reform

The province of British Columbia is experiencing a major restructuring of the educational system due to the report by the Sullivan Royal Commission on Education. Its year long investigation resulted in 83 recommendations (Sullivan, 1988) for improving the educational system. The recommendations dealt with a number of issues; school structure, curriculum, evaluation, teaching methodology, finance, and accountability among others. The commission's report led the Government of British Columbia to produce a mandate for Education (Brummet,1989a). The mandate described an educated citizen as

thoughtful, able to learn and think critically, and who can communicate information from a broad knowledge base; creative, flexible, self-motivated and who have a positive self image; capable of making independent decisions; skilled and who can contribute to society generally, including the world of work; productive, who gain satisfaction through achievement and who strive for physical well being; cooperative, principled and respectful of others regardless of differences; aware of the rights and prepared to exercise the responsibilities of an individual within the family, the community, Canada and the world.  
(Brummet, 1989a, p4)

In order to achieve such a goal, a mission statement was included in the mandate. It stated that



[t]he purpose of the British Columbia school system is to enable learners to develop their individual potential and to acquire the knowledge, skills, and attitudes needed to contribute to a healthy society and a prosperous and sustainable economy. (Brummet, 1989a, p3)

The mandate led to a policy statement called Enabling Learners, a document under Year 2000: A framework for learning. It reflected the new School Act that was implemented in September 1, 1989 (British Columbia, 1990). This document described, in general terms, the restructuring of the school system and the goals for all future policy statements. As Fleming (1991) stated

[w]e have given ourselves until 1999 to clarify the vision, develop the programs, implement them, assess and revise them, as necessary, and complete our program of change. With the cooperation and energy of our stakeholder partners - teachers, parents, school administrators, district officials, trustees, business, labour, and special interest groups we intend to succeed. (Fleming, p11)

Fleming states that central to the program are three main principles. These principles he states are founded in research and are: "learning requires the active participation of the learner ... people learn in a variety of ways and at different rates ... [and] learning is both an individual and social process." (Fleming, p 4) He concludes by saying that "in a learner focused system, its prime

purpose must be to help students learn." (Fleming, p 4)

Almost from the beginning parents were not impressed with the radical changes to their school system (Fennell, 1991). A change in government saw a review of the educational changes implemented by the Department of Education. The review determined from parents, teachers and school administrators that a number of the changes were successful in making the children's learning more interesting and relevant (Charbonneau, 1993b). They concluded that these should not be thrown away but should be built upon and strengthened. On the other hand, parents and the public had criticisms about the time line for implementation, and the lack of clear information regarding the standards expected of students. As a result there have been some revisions to the proposed changes.

Grade designations have been reinstated instead of the three division designations (primary, intermediate, graduation). Letter grades are to be reactivated for students in grades four to seven but how these are communicated to the parents is left up to the discretion of the school districts. These alterations along with the removal of the heading "Year 2000" represent the fundamental changes which are to be made to the reform. These changes, which are superficial in nature, do not affect the main thrust of the reform. The underlying principles of the reform - all students can learn; students learn at different rates and with different styles;

learning requires the active participation of the learner; and learning is both an individual and group process (Charbonneau, 1993a) - are still guiding the direction of educational reform. The first two principles indicate that self-paced learning is still a large part of the reform. It will require the departure from the traditional teacher centred group learning, to groups of students scattered through out a unit of learning or curriculum. This departure may involve programmed or guided instruction.

The rationale behind individualisation of instruction is that students enter class with widely divergent skills and motivations, and that while many students may be ready for what the teacher would present to the entire class, some do not have the prerequisite skills to understand what is being taught or will grasp the idea in a short time. In a highly sequential subject such as mathematics, where learning each skill depends on having mastered a set of prior skills, individualised approaches such as programmed instruction would appear to be especially needed.

(Slavin, p8)

The only problem is that individualised instruction has not generally been found to be successful in increasing mathematics achievement (Slavin, 1982). Many students find that programmed instruction is boring, it lessens social interaction by isolating students, and there are difficulties in implementation resulting from the large amount of marking (Slavin, 1982). This tends to

reduce the teacher to an administrator instead of an instructor (Slavin, 1982).

Other studies (Slavin, 1982; Suydam, 1985) have shown that the problems can be overcome and lead to an increase in mathematics achievement. In order to achieve these results though, the investigators had to redesign the instruction so as to alleviate the problems of the past. The contention was that past failures of programmed instruction were mainly due to motivational and managerial factors. The new structure incorporated cooperative learning, or placing students into teams with positive reinforcements for team accomplishments. To alleviate the managerial factors they involved the students in the marking of assignments. The resulting data suggested that the design for this mode of instruction is very important.

Developing programmed instruction or a variation of it is most probably a reality for the classroom teacher in British Columbia. The Department of Education present directions are mandating that continuous progress be an integral part of the educational system (Charbonneau, 1993a). The development of any materials for such a direction will be strictly the responsibility of the classroom teacher. One possible course of action that teachers may take would be to individualise the programs using current curricular materials. Therefore the aim of this project will be to:

- a) develop a set of instructional materials for the purposes of individualising a program using present curricular materials but incorporating a design that simulates directed instruction (guided instruction).
- b) give the students the choice as to whether they work individually, in pairs, or in groups for part or all of the self instructed modules or seek the help of other students or a teacher.
- c) provide an evaluation of the guided instruction by interviewing six students, four females and two males.
- d) develop another set of materials incorporating as many of the students' suggestions as are appropriate.

## **Method**

### **Background**

Presently, Tumbler Ridge Secondary School splits its school year into six parts; each part is five weeks of regular classes and one week of electives. The senior electives (for example Art, Drama, Foods, Calculus, Physical Education, etc.) and career preparation classes (for example Child Development, Business, etc.) which are offered during this time last for three of the elective weeks to meet Department of Education requirements. For the very first time grade ten students will be allowed to take one senior elective, or a career preparation class. Furthermore, all of the grade ten students would participate in the cooperative education program (placed with engineers, biologists, radiology technicians, radio station, health care, electricians, mechanics, etc.). The possible difficulty in placing so many students from grades 10 to 12 required that only half of the grade ten students participate at a time. This coupled with the time constraint on elective courses dictated that each group of grade ten students would participate for three consecutive elective weeks. While one half of the grade ten students are participating in the cooperative education program, the other half of the grade ten students and all the students in grades 8 and 9 would work on their core courses (English, Social Studies, Mathematics, Science) and French.

The grade 8 students would spend the entire week with their core teacher. Some of the teachers who teach the core subjects or French to students in grades 9 and 10 would be teaching a senior elective. Therefore, the students in these grades will be provided with modules developed by their respective teachers. The students in grades 9 and 10 would be intermixed and formed into groups to provide, in a small way, a multilevel class. These groups will then be given a schedule of room and course assignments for the week. This would provide the students with the opportunity to spend time with a teacher specialised in each of the courses. If however, their course teachers are available then they may receive assistance from them.

The students would complete the work assigned by their respective teacher any way they desire. For example, a student may decide to work on each of their course modules until it is completed successfully or they may decide to work on each of the course modules a little bit at a time in order to break up the day or to take advantage of available time provided by their course teacher. They may decide to work alone, or in groups. Regardless of their approach, they are expected to complete the units assigned by each of their teachers by the beginning of the week that they return to regular classes.

## Materials

A set of individualised instruction modules was developed for the trigonometry unit in grade ten mathematics. The modules were initially derived from curricular materials designed for teacher centred instruction but further development resulted in the incorporation of guided sample problems (fill in the blanks) to ensure the correct presentation, and grasp of knowledge. At the end of each section of the modules the guided questions were to be corrected by a fellow student or a teacher. (See appendix A for a sample of the module)

The students' evaluation was based upon the assignments for the week and a culminating quiz/test. To enhance motivation towards completing the modules within the stipulated time, a mark increase of 10% was available to those students who successfully completed the assignments and quiz/test by the end of the last day of elective week. The measure for success was a mark of 50% or higher. Finally there was a time requirement. They must have completed the module and all related evaluation materials by the end of the first day back in regular classes. If they were unsuccessful in meeting this time requirement they were assigned a mark of zero.



## Location

Tumbler Ridge is a northern community that is predominantly white Anglo-Saxon. The main economy is derived from the two coal mines located outside of town. The majority of the students come from blue collar families who have connections to eastern Canada.

## Time Line

The time line for this project was: September to March development of the modules; March 14-18 module one; May 2-6 module two; and June 6-10 module three. It was not possible to hold the interviews until the fourth week in August because the students were unavailable. To compensate for the delay, the students were given copies of the modules and interview questions at an initial meeting one week prior to the interviews. The students were encouraged to reflect about their experiences as they pertained to the interview questions.

## Students

Sixteen randomly chosen students participated in the project. Six students from amongst these were asked to participate in interviews, four females and two males. Each group of students incorporated a student from the high average ability, average ability and below average ability groupings. This was based upon their

achievement in grade ten mathematics.

### Interviews

The interviews took place in the last week of August. The first interview involved the female students Wendy (above average mathematics student), Mary (high average mathematics student), Taylor (average mathematics student) and Diane (below average mathematics student). The most interesting item of note was the very interesting, honest opinions expressed and how much better these opinions were expressed in comparison to the male students' opinions. The responses of the male students, Jack (above average mathematics student) and Vinney (below average mathematics student) appear to be less informative because they were either apathetic about the process, or they did not think about the distributed questions and experiences prior to interview. The responses given by the female students however, clearly indicated that they had given considerable thought to the distributed interview questions. (see appendix C for the complete transcription of the interviews).

## **Analysis**

The impact individualised instruction had upon the students is brought out in a number of themes found in the interviews. These themes include information about self-esteem, cooperative learning and learning styles. In order to withdraw this information it was necessary to organise the data according to the time line for the guided instruction modules. The time line for the modules can be divided into three distinct sections, the development of modules, utilising the modules and reflection upon module utilisation.

### Development of modules

The development of the modules initially meant changing lecture notes into a form presentable to a student. This meant enhancing the notes with detailed explanation, diagrams and examples. The resulting document was then given to the first group of students to test if anything else would be necessary other than some preliminary instructions on how they would have to use these documents to cover the required concepts.

Over the period of the first two elective weeks in October and December there appeared to be a problem with this form of modularised instruction. Colleagues told of a relatively high frequency of assistance given to students. The assistance given to the students was solely in the form of demonstrating the principles

along with some explanation. In addition, the students seeking assistance did not come predominantly from the lower range of ability but from the entire spectrum of the class; the frequency of students seeking assistance being highest for low achievers and lowest for high achievers. Discussions with students using the modules revealed a complaint about the modules being too difficult in learning the presented concepts. Reflection on the modules' presentation, in comparison with a classroom lecture, revealed the absence of teacher guidance through practice problems. To overcome this short coming, guided practice problems were developed. The end result was the guided instruction modules.

An unforeseen result of this development was the degree to which this development would effect the attitude of the subjects for this project. Apparently it was the major cause of the initial negative attitude of Wendy, Mary, Jack and Vinney. This is apparent by their responses to the question: What type of attitude did you have about this type of instruction before you started and why?

Mary: My attitude was pretty negative I didn't ... I had heard a lot from my peers and I thought I wouldn't learn as much as I would under a teacher.

Wendy: My attitude toward the module before we started was I wanted to get it over with. The reason for my attitude was because I had heard from my peers that

it was pretty difficult.

Vinney: Well, my attitude going into the module, I had heard from peers and friends that the modules were going to be tough and I thought, oh no, it's going to be really tough and hard to do...

Jack: Well, everybody didn't always tell me... that guys so hard, he's going to just torture you and you're going to fail and you're not going to pass and all that. You know you get thinking, oh my God, oh my God...

As a result the students were predisposed to a change in attitude when they were given the guided instruction modules especially if the modules alleviated the concerns about the initial set of modules. This is demonstrated by the students' responses about how or if their attitudes changed while they were utilising the modules.

Vinney: I had set myself up for it being really really tough so it kind of caught me off guard when I first did the first few questions thinking it wasn't as bad as I thought so I had to kind of stop and adjust.

Jack: Yeah, like once you really got into working and that and going through your module it wasn't as hard as you thought it was and had been led to think and all that.

- Mary: Yes. Mine changed. I didn't think it would be as bad as I thought at the beginning. ...
- Wendy: I think the reason for my change in attitude is that in the individualised module you can do as good as you want to or you can do as bad as you want to.
- Taylor: My attitude improved because I found it easy to learn.

### Utilising the Modules

The utilisation of the guided instruction modules can be partitioned into two areas. The two areas are learning preferences, and perception of learning.

#### Learning Preferences

The guided instruction modules allowed the students to establish the environment in which they wanted to work. For the majority of students this meant working in small groups for the majority of time although at some point all the students worked in small groups. Because the students established the working environment, this mode of instruction resulted in improving these students' self-esteem as compared to the classroom situation. This is demonstrated by the following exchange in the interview with the female participants.

S. Morrell: ... how did the group make you feel did it

give you a feeling of security, like these are people whom I can trust with maybe I don't know as much as they do, or was there a feeling of not being threatened in the sense that ... how can I put this? Some students in a class situation are afraid to ask questions because they don't want their friends to know that they don't understand and they may know and they don't really know whether or not they know at all but they want to give the impression that they do.

Diane: You've got it!

S. Morrell: Does this make sense?

Interviewees: Yes.

The improvement in self-esteem predominantly arose from their perception of their peers and how they thought their peers perceived them. For example

Diane: I noticed that, like working with Mary in a classroom situation, I felt like a lot of people knew more than I did but really when I was in the group working with people that I thought were really, really smarter than me, they were having the same problems that I was having.

In addition the comfortable working environment allowed for a more relaxed situation through peer interaction, peer observation and peer

tutoring as shown in the following.

Mary: When you work in a group I think there is more discussion.

Mary: Well, you know these people, so it's easier, if you don't understand they may not either and you can find out if they don't either.

Diane: Well, it was mostly some parts that they would have to show it and explain it to me but other parts we'd kind of work through it together and they would ... not like really teach me how to do it but like, explain it a different way that I would know how to do it ...

This self-designed environment allowed students who preferred to work unencumbered by a peer, to work individually. Therefore, the guided instruction modules suited some students' learning style as shown by the comments made by Taylor and Wendy who completed the modules predominantly through individual study.

Taylor: ... I just liked it because I could do it as fast or as slow as I wanted.

Wendy: What I like doing...what I like when I do it myself and I do it right.

Wendy: Well I think the only reason for me is cause when I ... when I work it out for myself, I can understand better and remember better.



Wendy: Yeah, I understand better...like ... the other kind, well, I'd rather find out how to do it myself.

Wendy: I think that I learn better that way.

Wendy: I feel I learn better that way.

Finally, self-esteem was boosted by the feeling of accomplishment. This shown by the following statements.

Wendy: About this type of instruction?  
Afterwards when you were done it, and you look at it and you feel like you did it yourself. Well even though I did I did get some help on it though.

Vinney: I thought it made me feel just a little bit better because I was basically...well the stuff was there just that ... but I thought I was teaching myself more than getting it dictated and taught to me so I thought I was doing better ... I was teaching myself so... I thought I was maybe ...

Jack: I liked it. I thought I was really good because ... it was like... Really good an' all cause you know, you actually had to do the work by yourself. It wasn't just you being helped all the time and it was teaching you like to be aggressive and that and really get things done. Which was good.

## Perception of Learning

An interesting concept to grasp was the way the students saw their learning. For the most part they believed that the amount of work and understanding was directly related. They did not see or consider the dependency on the guided instruction modules and on peer assistance as a factor in their understanding or grasp of the concepts as shown in the following exchange on why their evaluations were not as they expected.

S. Morrell: Why did you think you think you understood it all? Because ...

Taylor: Why? Because I did fairly well on my assignments.

Wendy: ... I thought I understood it because I also had done enough.

S. Morrell: Did you study for the quizzes, or the test?

Taylor: Not really, because I wrote it right after I was finished the module.

S. Morrell: Had any of you planned ... studied for the quizzes? You finished the module, wrote the quiz and that was it, you never sat down to ... go through everything.

Diane: I looked over my modules for my test and that was it.

S. Morrell: That maybe you should have done some studying? Even if it wasn't done in a

week.

Taylor: I don't think that it would have been different.

Vinney: I thought I understood the concepts, well ... all of them, ... but I guess there was a couple that I didn't understand that I thought I had done right ... that I'd done right but I had done the work differently somehow. So I had gone to the teacher and after writing the quizzes and stuff finding out I didn't do it right so I'd done it over again and found out.

Vinney: Well, when you're teaching yourself and you get an answers right you think you're doing everything right but you might be doing some things, little things, different and getting like a fluke answer or something right.

It was only upon reflection of their experiences with the guided instruction modules that they recognised the full extent of their dependency and possible ways to overcome these dependencies as is shown in the following excerpts from the interviews.

S. Morrell: So, you depended too much then on the modules?

Diane: On the guided problems and explanations.

S. Morrell: What would you have to do, what would a student, I should say, have to do?

Diane: Not rely on the guided problems and explanation.

Mary: As much.

S. Morrell: Is there not no other, did you have a crutch? What I mean by crutch, was there something that you depended on a lot when you were doing the modules that you didn't have when you were writing the test?

Vinney: Your peers.

### Reflection Upon the Guided Instruction Modules

The modules were considered the better source of instruction when compared to the regular text book, although a minority of students did use the text for the purpose of consulting the example problems that are given before each exercise. For example:

Jack: Yeah, it prepared me pretty well. Like, it started you off so that you were just kind of looking at examples and you know you started on small problems that were easy. It worked you up and it was nice cause then you didn't just go straight into it and not have any idea what you were doing.

Mary: ... The textbook was okay but I liked the module much better.

Though the students felt prepared for their exercises, they believed

that they could have been better prepared had there been more guided problems of the higher degree of difficulty type. They felt that more of this type of guided problem would result in more independence for the student; less teacher assistance and better preparation for the exercises.

Diane: Yes, more guided. But not of like of...  
like of the beginning of them. Yeah. Like  
more harder.

Wendy, Mary and Taylor agree.

S. Morrell: So like, let's say, there are three levels  
of mathematics problems in the  
exercises called A, B, and C. "A" being  
easiest, "B" being mediocre to hard, and  
"C" are hard.

Diane: Yeah. Give one for "A", two for "B" and  
definitely two for "C" I think.

The reason for choosing more of this type of question in the module originated from the majority of students' beliefs that the guided problems were the most beneficial part of the guided instruction module.

Taylor: Well, I liked the guided problems  
because it,... I know who did it, it kind  
of showed me how to do it but it also ...  
explained it.

Further improvement of the modules would include changing the way the modules were utilised. The female students felt that the

dependency on peers and the guided instruction could be alleviated through establishing the utilisation of the modules through a three part procedure. First, the student would get an improved module (contains more guided problems of the higher degree of difficulty) that does not indicate the exercises. Second, when the student has demonstrated their knowledge contained in the first part they hand in the first part and obtain the list of exercises to be done. Third, upon completion of the exercises they obtain the first part and the corrected exercises to study for the quiz or test. On the other hand the male students felt that the modules were fine in their present form but more time was required to achieve a better understanding of the concepts in the unit and for better success on the evaluation.

Jack: I think you'd probably want to be given more time cause your time was limited to what you could do really. So, you know, you might be thinking, oh if I don't get this done, I'm dead. So, if you were given more time, I think you could probably get better results cause you could take your time more, and you could also think about the concepts a little more.

## Conclusion

The guided instruction modules appear to be successful in some respects and unsuccessful in other respects. The success of the instruction came in the form of improving the self-esteem of students and allowing the students to design the environment for learning (individual or small group). The mode of instruction was not as successful in relaying the necessary mathematical skills as measured by the designed evaluation tools (two quizzes and one unit test).

The non-success of individualised instruction in conveying the necessary mathematical skills was not too surprising. The students have had little to no experience with this mode of instruction. It calls into question whether they had or would obtain the necessary skills. This particular mode of instruction requires the participant to: be able to decipher information through the process of questioning oneself (how, why); make connections between ideas or concepts; be self-disciplined to stay on task; be responsible for the material; and be self-motivated. Self-motivation and good work habits were pointed out by one of the male participants, Jack, as being very necessary if a student was going to be successful.

Jack: I think if you have really good work habits that's going to help you a lot because that tends to keep you on track more ... more focused and other things,

like you know. Like if you work well with your teachers and you understand the concepts such as I said before, its definitely a bonus and it will help and like wanting is definitely a major.

The lack of these skills may be a key to the success of individualised instruction in the future and explains its failure in the past.

The guided instruction modules were utilised again in the fall of 1995 without any of the changes suggested by the students. The difference that existed though originated from experience. Another unit of the curriculum was modularised and given to the students in the regular schedule of classes. The students were under the direct supervision of their teacher who emphasised the proper approach to this type of instruction. The majority of students were successful in writing the unit quizzes and the unit test. These same students were also more successful in writing the exact same evaluations for the modularised trigonometry unit.

The success of this mode of instruction in the areas of self-esteem and learning environment should not be over looked nor out rightly dismissed. These areas are very important in the learning process. The amount of influence these items have on learning is an area for further research, but common sense suggests that it must be significant. The problem to be overcome for individualised



instruction appears to lie in the areas of general problem solving and reading comprehension. As demonstrated by the second modularised unit, it may be possible to overcome the lack of skills through an emphasis on the required learning process for this type of instruction.

This project has affirmed a number of beliefs. It has affirmed a belief that a majority of students have an attitude of "get it done" when learning is left in their control and this attitude takes precedence over learning. It has affirmed that students currently lack most of the skills necessary for this mode of instruction and will require guidance in order to acquire these skills. It showed that most students would require more time than they would under teacher centred instruction to complete concepts because most students would not stay on task due to socialising with friends. This was supported by the responses of the female students about the amount of time spent completing each module. Consider the following excerpt from the interview.

Wendy: The module took me approximately 12 hours.

S. Morrell: Okay; how about you Diane?

Diane: The same. About 2 full days.

S. Morrell: Two full days?

Diane: Which is 6 hours each, so it would be 12 hours.

S. Morrell: How about you Mary?

Mary: Twelve hours.

S. Morrell: Twelve hours? And Taylor?

Taylor: Seven.

S. Morrell: Seven? Now, Taylor had a large difference in the number of hours. Did you, Taylor, work with any of these three young women when you were doing your module or did you work strictly by yourself?

Taylor: Mostly by myself.

S. Morrell: What I'm trying to ask I guess is, can you think of what it would be, why it took them 5 hours more than ... would you attribute it just because you found it easier than maybe they did or did you have a different get it done as fast as possible sort of thing?

Taylor: Well I guess I did that but, I also worked on the assignment pretty quick.

Mary: When you work in a group I think there is more discussion.

S. Morrell: The 12 hours that Wendy, Mary and Diane spent on this, is there any of that time, you mentioned that, Mary that you were working in groups; would all that 12 hours be strictly working or would that also involve perhaps the

occasional, let's say 10 or 15 minutes talking about what we're doing on the weekend?

Mary: Probably.

S. Morrell: What about you Diane?

Diane: Oh yeah.

S. Morrell: Okay now, if you were to eliminate the social part, how much do you think you would do? Would you say 12 or would it be down to say 9 or 10?

Diane: Ten.

S. Morrell: Ten? So there were about 2 hours of talking in there?

Diane: (confirmation)

Most importantly, time and curriculum requirements in conjunction with student understanding are the major concerns that influence the decisions taken by a number of teachers about teaching approaches, especially when students must be prepared for the next grade level. Lastly, the interviews demonstrated how a teacher's comment can affect some students' self esteem regardless of the intent. This was revealed by the following exchange during the interview with the female students.

Taylor: Well okay. I didn't feel as good, you know. Like I just think I feel ... I don't

know... it's really weird, I didn't feel like I understood and so I didn't want to ask questions because I felt that you would say: okay well you shouldn't be here. You don't understand.

S. Morrell: I've never said that to anyone.

Diane: You said that at the very beginning of the year, you said if you don't understand this stuff then you're in the wrong class...

S. Morrell: Okay but I never said it to a student.

Diane: Oh no! Oh no!

S. Morrell: I said it to the entire class.

Diane: I just felt that you might say that or something like not, not just to me but like something like, you don't understand, what are you stupid? (Laughing).

Conversation is muffled, laughing ...

S. Morrell: I never done that in class either.

Diane: No but that just not the only one I ... I don't know.

S. Morrell: Are you saying that I'm giving you that impression?

Diane: Yes.

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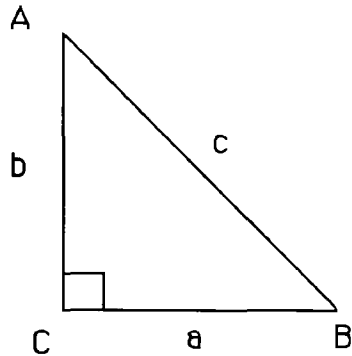
## Appendix A

### Trigonometry 10 Module

I. Pythagorean Theory. See text pp 25-29.

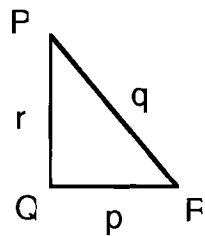
You should read p 25 and example 4 p 26.

In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides. In a triangle that is labelled ABC it is written in symbols as

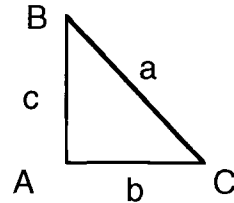


$$c^2 = a^2 + b^2$$
$$c = \sqrt{a^2 + b^2}$$

If the triangle is labelled any other way the equation changes to fit the name of the triangle, for example



$$q^2 = p^2 + r^2$$



$$a^2 = b^2 + c^2$$

Another way of remembering the theory is to call the two sides legs. The theory changes to: the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs. The key to remembering either form is to know that the longest side is **always** the hypotenuse.

Find the length of the hypotenuse in  $\Delta ABC$  given  $b = 3$  and  $a = 4$ .

$$c^2 = a^2 + b^2$$

$$c^2 = 3^2 + 4^2$$

$$c^2 = 9 + 16$$

$$c^2 = 25$$

$$c = \sqrt{25} = 5$$

Another way to have shown your work is to use the second form of the equation.

$$c = \sqrt{a^2 + b^2}$$

$$c = \sqrt{3^2 + 4^2}$$

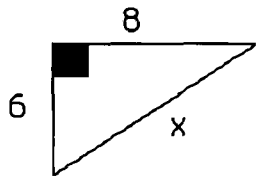
$$c = \sqrt{9 + 16}$$

$$c = \sqrt{25} = 5$$

Use the guided problems on the next page to practice presenting your work.

Fill in the blanks with the appropriate variables or numbers.

1. Find the value of the missing side.    2. Find the value of the missing side.



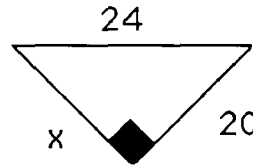
$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}} + 6^2$$

$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}} + 36$$

$$\underline{\hspace{2cm}} = 100$$

$$x = \underline{\hspace{2cm}}$$

$$x = 10$$



$$x^2 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$x^2 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$x^2 = \underline{\hspace{2cm}}$$

$$x^2 = \underline{\hspace{2cm}}$$

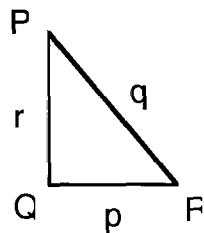
$$x = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}} = 4\sqrt{11}$$



Find the length of the p in  $\Delta PQR$  where  $\angle Q = 90^\circ$ ,  $q = 13$  and  $r = 5$ .

To solve this problem you first have to sketch the triangle so that you can determine how to write your equation.



$$q^2 = p^2 + r^2$$

$$q^2 = p^2 + r^2$$

$$13^2 = p^2 + 5^2$$

$$169 = p^2 + 25$$

$$169 - 25 = p^2$$

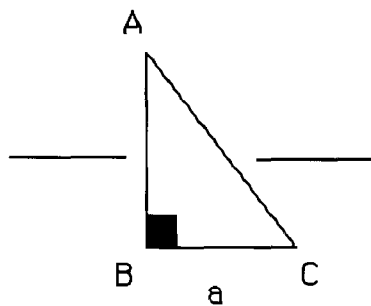
$$p^2 = 169 - 25$$

$$p^2 = 144$$

$$p = \sqrt{144} = 12$$

Fill in the blanks with the appropriate variables or numbers.

3. Find the length of a in  $\Delta ABC$  where  $\angle B = 90^\circ$ ,  $b = 13$  and  $c = 5$



$$a^2 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$a^2 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$a^2 = \underline{\hspace{2cm}}$$

$$a^2 = \underline{\hspace{2cm}}$$

$$a = \underline{\hspace{2cm}}$$

$$a = \underline{\hspace{2cm}}$$

Once you **know** which **type of side** you are requested to determine it will be faster to do the problems another way. One such way to solve Pythagorean type questions is to use alternate forms of the theory which are:

hypotenuse = the square root of the sum of the squares of the legs.  
(the square root of the squares of the numbers given added together)

$$\text{hypotenuse} = \sqrt{(\text{large \#})^2 + (\text{smaller \#})^2}$$

leg = the square root of the difference between the squares of the hypotenuse and leg.  
(the square root of the larger number squared - smaller number squared)

$$\text{leg} = \sqrt{(\text{large \#})^2 - (\text{smaller \#})^2}$$

The key to using these alternate definitions is recognizing that when solving for a leg the actual mathematics does not recognize a difference in the legs. Consider the last example involving  $\Delta PQR$ . The short form would be

$$\begin{aligned} p &= \sqrt{q^2 - r^2} \\ p &= \sqrt{13^2 - 5^2} \\ p &= \sqrt{169 - 25} \\ p &= \sqrt{144} = 12 \end{aligned}$$

Had we been asked to find  $r$  it would be almost identical except for the variables.

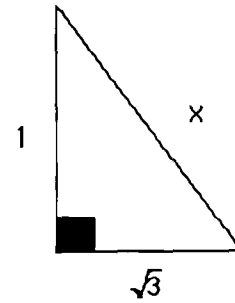
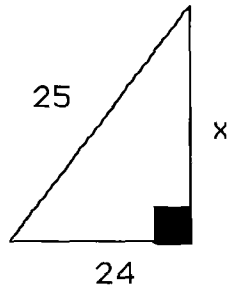
$$\begin{aligned} r &= \sqrt{q^2 - p^2} \\ r &= \sqrt{13^2 - 12^2} \\ r &= \sqrt{169 - 144} \\ r &= \sqrt{25} = 5 \end{aligned}$$

In using this alternate form of Pythagoras you can eliminate the first step which is algebraic and write only the last three steps. **Remember**, like all short cuts they should only be used when you are certain you know how to do a problem!

Try the guided problems on the next page for practice.

Fill in the blanks with the appropriate variables or numbers.

5. Find the value of the missing side.      6. Find the value of the missing side.



$$x = \sqrt{\quad - \quad}$$

$$x = \sqrt{\quad - \quad}$$

$$x = \sqrt{\quad}$$

$x = 7$

$$x = \sqrt{\quad + \quad}$$

$$x = \sqrt{\quad + \quad}$$

$$x = \sqrt{\quad}$$

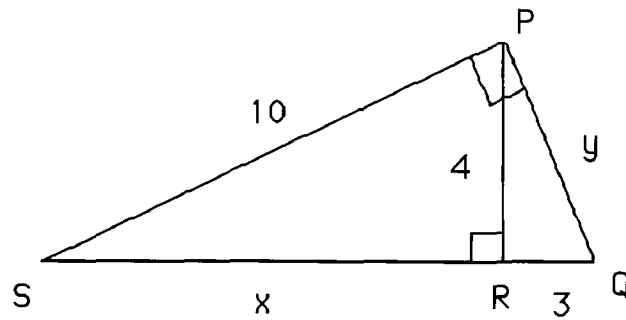
$x = 2$

The rules for expressing your answer are:

1. If you can take the square root of the number (  $\sqrt{16} = 4$  or  $\sqrt{169} = 13$  ) then you do so.
2. If there are decimals in the problem (given a value of 24.5) then your answer should have as many decimal places as are given to you.
3. Unless you are told to express your answer to a certain decimal place, in all other cases your answer should be expressed as an exact answer; **an exact answer is a radical not a decimal.** (  $\sqrt{20} \neq 4.472136$  but  $\sqrt{20} = 2\sqrt{5}$  )

Fill in the blanks of the following guided problem.

Find the value of  $x$  and  $y$  in the following diagram.



$\triangle PRS$  is a right  $\triangle$

$\triangle PQR$  is a right  $\triangle$

$$x = \sqrt{\frac{\quad^2}{\quad} - \frac{\quad^2}{\quad}}$$

$$y = \sqrt{\frac{\quad^2}{\quad} + \frac{\quad^2}{\quad}}$$

$$x = \sqrt{\frac{\quad^2}{\quad} - \frac{\quad^2}{\quad}}$$

$$y = \sqrt{\frac{\quad^2}{\quad} + \frac{\quad^2}{\quad}}$$

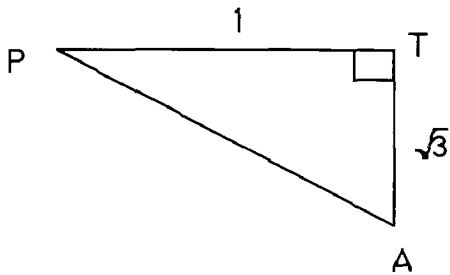
$$x = \sqrt{\frac{\quad^2}{\quad}}$$

$$y = \sqrt{\frac{\quad^2}{\quad}}$$

$$x = 2\sqrt{21}$$

$$y = 5$$

Find the length of PA in the following diagram.



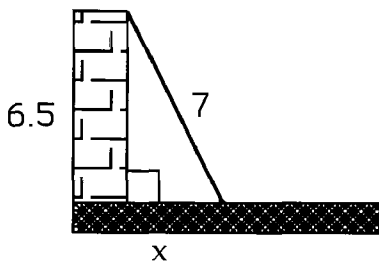
If you do not want to write PA for your variable, PA can be expressed as t.

$$\begin{aligned}
 t &= \sqrt{\quad + (\sqrt{3})^2} \\
 &= \sqrt{\quad + (\sqrt{3})(\sqrt{3})} \\
 &= \sqrt{\quad + \quad} \\
 &= \sqrt{\quad} \\
 t &= 2
 \end{aligned}$$

Word Problems.

A 7 m ladder is placed against a wall so that it reaches a lamp 6.5 m above the ground. How far is the base of the ladder from the wall.

First sketch a diagram and place all the information from the problem on it as well as any other information you should know.



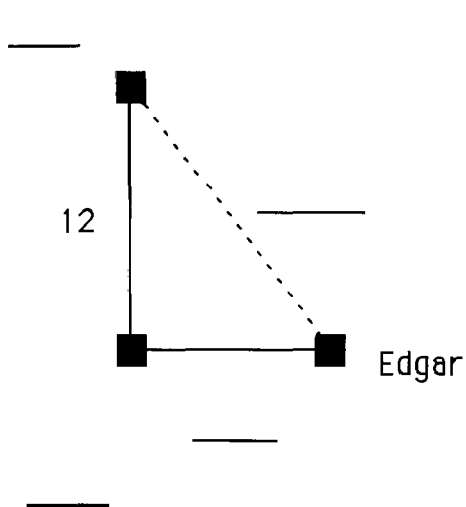
From the diagram we see that we are determining a leg.

$$\begin{aligned}
 x &= \sqrt{7^2 - 6.5^2} \\
 x &= \sqrt{49 - 42.25} \\
 x &= \sqrt{6.75} \\
 x &= 2.6
 \end{aligned}$$

The base of the ladder is 2.6 m from the wall.

Guided word problem.

Northrup is 12 km north of Centerville. Edgar is 9 km east of Centerville. How far is Edgar from Northrup?



$$y = \sqrt{\quad^2 + \quad}$$

$$y = \sqrt{\quad + \quad}$$

$$y = \sqrt{\quad}$$

$$y = 15$$

Do the following Exercises. USE EXACT VALUES UNLESS INSTRUCTED OTHERWISE.

Text

pp 27-28

1: a, b, d, e

3: a, d

5

6

(12)

8

9

11

12

## Appendix B

### Interview Questions

1. What type of attitude did you have about this type of instruction before you started? Why?
2. Did it change during the course of working on the modules? Why?
3. How much time, approximately, did it take you to complete the modules?
4. Did the explanation in the module prepare you for the exercises that followed?
5. What part of the module prepared you for the exercises? What part did not prepare you for the exercises?
6. Did you work in a group or individually? When?
7. How much of the time, percentage, did you work alone? in a group?
8. Did working as a group help you better understand the concepts? Why?
9. Were there times when you needed further explanation of the concepts? When?
10. Were there times you needed assistance from a teacher? Why?
11. How did this type of instruction make you feel about mathematics? Why?
12. When you were finished, did you feel like you understood the concepts? Why?
13. Would you recommend this type of instruction in mathematics to other students? Why?
14. What changes would you suggest in order to improve the modules?

## Appendix C

### Transcription of Interviews

S. Morrell: This is the interview involving four of the females who participated in the individualised mathematics instruction for trigonometry at the grade 10 level. The four women are: Taylor, Wendy, Diane and Mary.

The first question I would like to ask you women is: what type of attitude did you have about this type of instruction before you started and why?

Taylor?

Taylor: Well, I did not like the idea because there was no teacher instruction and I found... well, I didn't find, I thought that I wouldn't learn anything.

S. Morrell: You thought you wouldn't learn anything? Okay. What about you Mary?

Mary: My attitude was pretty negative I didn't ... I had heard a lot from my peers and I thought I wouldn't learn as much as I would under a teacher.

S. Morrell: Okay. How about you Wendy?

Wendy: My attitude toward the module before we started was I wanted to get it over with. The reason for my attitude was because I had heard from my peers that it was pretty difficult.

S. Morrell: How about you Diane?

Diane: My attitude was good because I thought learning like at your own pace was better than learning in a class situation for me.

S. Morrell: Okay. Did your attitude change during the course of the modules and why? Did yours change Diane?



Diane: No.

S. Morrell: No?

Diane: No.

S. Morrell: Not at all? Not even a little bit?

Diane: No.

S. Morrell: Why?

Diane: Well because I learned at my own pace and I got help from my friends and stuff.

S. Morrell: Okay. How about you Mary?

Mary: Yes. Mine changed. I didn't think it would be as bad as I thought at the beginning. But I still prefer being taught by a teacher.

S. Morrell: Okay, so it improved? What would you attribute to the improvement in attitude?

Mary: I don't know.

S. Morrell: Well would it be that, that it was ... just because it was easier or did you like it a little bit that you could teach yourself or that you could go at your own...

Mary: Yeah; it was different.

S. Morrell: It was different.

Mary: Something new.

S. Morrell: Okay; how about you Taylor? Did your attitude improve or not improve and why?

Taylor: My attitude improved because I found it easy to learn.

- S. Morrell: Easy to learn? You found the whole ... all the ideas a lot easier to approach?
- Taylor: No; I just liked it because I could do it as fast or as slow as I wanted to.
- S. Morrell: Okay; how about you Wendy?
- Wendy: My attitude did change. It changed from ... I still wanted to get it over with but I also wanted to do my best.
- S. Morrell: You wanted to do your best at the same time. Okay, so what would you attribute then to your change in attitude? Was it the want to succeed, is that what you're attributing your change in attitude about or would it be because you like the idea of teaching yourself? Or, as Taylor said that working at their own pace?
- Wendy: I think the reason for my change in attitude is that in the individualised module you can do as good as you want to or you can do as bad as you want to.
- S. Morrell: Wendy has mentioned twice now the idea or attitude of get at it and get it over with. Would you say Diane, that you had that similar type of approach as well or not?
- Diane: No, not really. I don't know. In a way, I did, but not really, because if you get it done as fast as that then you won't really learn it ... like you just kind of get at it ...you know, so on.
- S. Morrell: What about you Taylor?
- Taylor: Yeah; I just wanted to get it over with because when we had done we had a test when we finished the first module.

S. Morrell: Okay. Let's just move on to the next question. How much time approximately did it take you to complete the module? If you had to, if you were to put all your time together in a row, how long do you think it took you? Ten hours, 8 hours, 6 hours? Approximately? That would include the quizzes and tests if you could? Okay, how about you Wendy?

Wendy: The module took me approximately 12 hours.

S. Morrell: Okay; how about you Diane?

Diane: The same. About 2 full days.

S. Morrell: Two full days?

Diane: Which is 6 hours each, so it would be 12 hours.

S. Morrell: How about you Mary?

Mary: Twelve hours.

S. Morrell: Twelve hours? And Taylor?

Taylor: Seven.

S. Morrell: Seven? Now, Taylor had a large difference in the number of hours. Did you, Taylor, work with any of these three young women when you were doing your module or did you work strictly by yourself?

Taylor: Mostly by myself.

S. Morrell: What I'm trying to ask I guess is, can you think of what it would be, why it took them 5 hours more than ... would you attribute it just because you found it easier than maybe they did or did you have a different get it done as fast as possible sort of thing?

Taylor: Well I guess I did that but, I also worked on the

assignment pretty quick.

Mary: When you work in a group I think there is more discussion.

S. Morrell: The 12 hours that Wendy, Mary and Diane spent on this, is there any of that time, you mentioned that, Mary that you were working in groups; would all that 12 hours be strictly working or would that also involve perhaps the occasional, let's say 10 or 15 minutes talking about what we're doing on the weekend?

Mary: Probably.

S. Morrell: What about you Diane?

Diane: Oh yeah.

S. Morrell: Okay now, if you were to eliminate the social part, how much do you think you would do? Would you say 12 or would it be down to say 9 or 10?

Diane: Ten.

S. Morrell: Ten? So there were about 2 hours of talking in there?

Diane: (confirmation)

S. Morrell: Okay; number 4 here on my interview sheet: Did the explanation in the module prepare you for the exercises that followed? Did the explanation in the modules, not the textbook, just the modules did they prepare you for what you had to do? What about you Wendy?

Wendy: The exercises in the booklet or exercises in the textbook?

S. Morrell: Okay, you had the module, right (confirmation), it had an explanation part to them, right (confirmation) and

then there were practice questions shown to you and then some guided problems, right (confirmation) and then maybe some more explanation and then the same process again but at the very end, there would be a list of problems that you had to do with the textbook.

Wendy: Oh.

S. Morrell: So, from the very beginning of the first explanation to the very first exercise assigned to you to work on, did that explanation prepare you?

Wendy: Yeah.

S. Morrell: It did. Okay. What about you Taylor?

Taylor: Yeah, although there was a couple of areas that gave me a little bit of trouble.

S. Morrell: So there were, in your opinion, there were a couple of areas that were lacking in their explanation or was it an area that you needed extra help with ...?

Taylor: I think I needed extra help with.

S. Morrell: Okay, what about you Mary?

Mary: Yup, I agree with Wendy.

S. Morrell: You agree with Wendy. How about you Diane?

Diane: The explanation with the guided problems.

S. Morrell: The explanation plus the guided problems?

Diane: Yeah ... but there could have been more guided problems.

S. Morrell: Okay. I got a question for you and it brings up part of ...(reference to interview questions). The next

question says what part of the module prepares you for the exercise and what part did not prepare you for the exercise? So, as I was just talking to Wendy about the structure of these (modules are held up), there's an explanation, a practice question, a guided problem, some more explanations, another practice question, another guided problem and some exercises lastly. What parts were the most useful to you? The explanations? The practice and guided, or just one part of that? Wendy?

Wendy: The part that helped me to understand the most when I look back ... when I finished doing the explanation and guided problems in the modules book and then I started the exercises and if I got lost in the exercises I'd go back to the practice problems and review.

S. Morrell: Not the guided problems just the practice?

Wendy: Well, I used the guided problems too but I felt that the examples helped me more.

S. Morrell: Okay. Now ... did the explanation help you with the examples or did you not need an explanation at all?

Wendy: I liked the explanation there too because I could see the words that said what to do.

S. Morrell: Okay. The module referred to in the instruction told you to read the textbook. Did you find the textbook useful at all?

Wendy: When I was doing a textbook exercises, if I couldn't understand how to do it from the examples and the explanations in the module, then I'd try and find the examples in the textbook.

S. Morrell: Okay. Were they helpful in helping you?

Wendy: ...I don't know but if I... if I couldn't understand it from

the textbook explanation that's usually when I would see a teacher.

S. Morrell: So, if we talk about the explanation in the textbook, the examples in the textbook and then the explanations, examples and guided problems in module, of those five, would you say with the examples and guided problems or examples and explanation in the modules?

Wendy: I think I'd still say the explanation and examples in the modules.

S. Morrell: How about you Diane?

Diane: The explanation.

S. Morrell: You liked the explanation the best?

Diane: Yeah.

S. Morrell: What about the examples? Did they not help at all?

Diane: Well, they did but I'd have to have stuff explained like... like with the guided problems in a way you were kind of taught step by step sort of thing and that's what I like.

S. Morrell: So you liked the guided problems.

Diane: Yes. I really liked them but without the explanation you wouldn't be able to work through them.

S. Morrell: You need both.

Diane: Yes.

S. Morrell: Okay now, when I was talking to Wendy, I mentioned that the textbook had an explanation in it and examples so there's actually textbook and their

examples in the textbook, the explanation, the practice and guided problems in the module, of those five things, what would be the most useful?

Diane: The guided problems and explanation in the modules.

S. Morrell: In the modules, not the textbook. What did you find most useful Mary?

Mary: The explanation and the examples in the module.

S. Morrell: In the module?

Mary: Yes. The textbook was okay but I liked the module much better.

S. Morrell: How about you, Taylor?

Taylor: Well, I liked the guided problems because it,... I know who did it, it kind of showed me how to do it but it also ... explained it.

S. Morrell: Okay. Just the guided problems? Did you need the explanation in the module?

Taylor: Oh, I needed all of it.

S. Morrell: You needed all of it?

Taylor: The examples, the explanation and the guided problems.

S. Morrell: So you needed all three in the module? What about the textbook?

Taylor: I didn't use the textbook.

S. Morrell: You didn't use the book at all? Okay. What about ... Okay, so if those parts helped you, then the remaining part must have not been of any use to you? Would that



be fair to say? Like for example when you said that just the explanation and the practice problems helped you; would you say that the other parts ... the guided problems, textbook explanation and the textbook examples would not be of any use?

Wendy: No, I'd still use them because I mean some of the assignment problems they have different... they follow a different routes, the solutions would follow a different route so those helped me too.

S. Morrell: Okay so would it be more fair to say that what you said earlier about what helped you would be what gave you the most help?

Wendy: Yes.

S. Morrell: And the other portions helped you but to a lesser extent? Would there be any disagreements with that?

Interviewees: No.

S. Morrell: No disagreement with that? All right. The next thing I'd like to know is whether or not you worked as a group or individually and when you did that. Now to work as a group, it means that you sat down as say four individuals and you're working on a problem and you're having a problem with a particular exercise and you ask for help or you discuss how to approach that problem, if indeed maybe all four of you are having the same trouble with the same question. So, that's what group work would be about. Or, you might, one person in the group may know how to do a problem and you'd share your approach on how to do that problem or any of you may have a problem with another one and you get help from someone else in the group, any combination like that. When you do that, was it just for word problems, was it just for regular problems or was it just the most difficult problems or were there concepts you had trouble with? When? When did you

work as a group and when did you work as an individual, when you were by yourself? Got that? How about you, Taylor?

Taylor: Well I worked ... the time I did work in a group it was probably the most difficult problems.

S. Morrell: So it would be word problems or just regular problems or both?

Taylor: Both.

S. Morrell: Both? How about you Wendy?

Wendy: Individually a lot of the time and I worked ... any time I worked in a group I discussed with another person or with a teacher when I had trouble with a word problem.

S. Morrell: Now when you say you discussed it with another person, was that another student in class or you were working with at the time or ... ?

Wendy: Well I'd try and ... I wouldn't be in a group...usually I wouldn't be in a group with them but I'd try to find them to ask them or if I couldn't find them then I'd ask a teacher.

S. Morrell: Now when you say you discussed it with them, did you like, in a sense, present them with an idea about how you think this might be done and then they may or may not agree or ... ?

Wendy: I might have sometimes, I can't remember.

S. Morrell: Could you give me an idea of what you mean then by discussing it with some other individual?

Wendy: Well if, you see if I ran across a question and I didn't know how to approach it I'd go see someone.

- S. Morrell: Did this other person know how to do it?
- Wendy: Well I think I would ask them, I'd ask them if they knew how to do it or had an idea how to do it, because I didn't know how.
- S. Morrell: Right and if they didn't would you move on?
- Wendy: No, I'd usually try and ... if there was no teacher help available I would try to move on then go back to it later.
- S. Morrell: So you wouldn't discuss it any farther with your friends?
- Wendy: You mean try to find a possible solution?
- S. Morrell: Between the two of you, yes.
- Wendy: Well, I think you understand that we didn't go over board or anything on it (laughing).
- S. Morrell: How about you Diane? How did you feel about working in a group or as an individual can you identify with Wendy's type of trouble, was it...? (Diane is hesitant) or when you worked in a group and when you worked as an individual?
- Diane: I mostly worked, I don't know, we were kind of off at our own table and parts of the time we worked individually but if there was somebody had a problem, like you'd ..., do you understand me now.
- S. Morrell: Okay, so you worked in a sense around a table, or as a group, in a sense, that were there as one ... sitting in the same area around the same table, right? (Diane: yeah) And you'd work on your problems and then when you had trouble then you would approach someone else in the group is that right?

Diane: Yeah.

S. Morrell: Okay.

Diane: And I also took my work home, once or twice so that would be like I worked individually for a bit and that didn't really help because I got stuck.

S. Morrell: Now, when did you need the assistance, were the problems you ran into were they strictly just any type of problems that you needed assistance on or were they a particular type of problem like a word problem or were there both?

Diane: Well, actually what it was is ... if it was learning something new like... at the very beginning with the very first... there is a Pythagerr (S. Morrell: Pythagoras) Pythagoras, yeah. Uh, I needed explanations for how to get started like at the beginning of questions then after that I could go on and then maybe half way through the exercise or whatever when it started to get harder and little things like little tricks and stuff then I'd have to get help with.

S. Morrell: Okay. How about you Mary?

Mary: Ah, I worked in a group during school most of the time. Diane and me sat in a group and when we needed help, we asked each other and worked individually like, you know what I mean...we worked in a group when we needed help.

S. Morrell: What about you, were there just regular types of problems you had trouble with or would it be more like Taylor's, the more difficult problems and it varied whether it was word or regular type? or were there both?

Mary: Yes.

S. Morrell: What would you say your percentage of time spent say in a group, individual teacher or whatever? Taylor?

Taylor: I'd say about 80% of the time working alone and about 20% working with either a partner or a teacher.

S. Morrell: Okay. How about you Wendy?

Wendy: I spent about 15% of my time getting teacher help or getting or like ... talking with a friend about a difficult problem and 85% of my time I worked individually.

S. Morrell: You never got any teacher help at all?

Wendy: No, about 15%.

S. Morrell: I'm just a little slow. Forgive me. How about you Diane?

Diane: I spent 60% time working in a group but the other time like, the 40 % was just on my own, or 35% was on my own and 5% was with a teacher.

S. Morrell: Okay, when you say 60% you mean in that situation we talked about before, I mean it was a group of people in the same location ...

Diane: Yeah. But there was times within that specific group that I did work on my own.

S. Morrell: Okay. How about you Mary?

Mary: About 50% in a group, and I'd say about 10% with a teacher.

S. Morrell: Okay. Did working as a group help you better understand the concepts and why? If you were having trouble and you were working in a group you would ask someone in that group to give you assistance. Was

that...did that lead to a better understanding of the concepts? Taylor?

Taylor: In some cases it did.

S. Morrell: It didn't help you all of the time?

Taylor: Not all the time.

S. Morrell: Can you distinguish between the two and why?

Taylor: Well, I can't really distinguish between the two, but sometimes the person I was asking, they might have had trouble with it too.

S. Morrell: Okay. How about you Wendy?

Wendy: I felt working individually or trying to figure out the problems myself helped me better understand the concepts. But there were sometimes when I tried to figure it out and I looked at the examples in the textbook and in the module and like I didn't understand it so, there were times when I got other help from somebody else. But when I worked by myself I felt I could understand the concepts better when I tried to do it myself.

S. Morrell: How about you Diane?

Diane: Working with a group, like helped me better because sometimes somebody in the group would be experiencing the same problems as I was and we could work it out together or somebody else would just know it and could explain it to us.

S. Morrell: Okay. How about you Mary?

Mary: Yeah I think it would help me ... sometimes it wouldn't and sometimes it would. When it did it was someone else could understand it if I didn't and could help me

but if it didn't it would usually ... if you get someone to help you maybe they do it in a different way, you might not understand their way of doing it but there's another way to do it.

S. Morrell: Right.

Mary: That doesn't help me.

S. Morrell: No. Two thoughts that come to mind with regards to all your answers to this last question is: When you were working in a group and you were getting assistance from members in that group, did they basically show you or did they show you and explain to you how to get that solution, or did they teach you to get to the answer yourself? Do you understand what I'm saying? (Diane confirms that she understands) What would you say to that Diane?

Diane: Well, it was mostly some parts that they would have to show it and explain it to me but other parts we'd kind of work through it together and they would ... not like really teach me how to do it but like, explain it a different way that I would know how to do it ...

S. Morrell: Okay. How about you Mary?

Mary: They would show and explain.

S. Morrell: Show and explain. How about you Wendy?

Wendy: When I got help, I think they showed and explained.

S. Morrell: It wasn't just a matter of showing and then that was it, move on to the next one?

Wendy: Well, if they didn't explain I'd usually ask them to because I'd want to know how to do it when I came back to it any ways.

S. Morrell: How about you Taylor?

Taylor: Show and explain also.

S. Morrell: No one would just gave you a show and no explanation

Taylor: No. Because then I wouldn't understand it.

S. Morrell: All right. The other question that this last one brought to mind is: how did the group make you feel did it give you a feeling of security, like these are people whom I can trust with maybe I don't know as much as they do, or was there a feeling of not being threatened in the sense that ... how can I put this? Some students in a class situation are afraid to ask questions because they don't want their friends to know that they don't understand and they may know and they don't really know whether or not they know at all but they want to give the impression that they do.

Diane: You've got it!

S. Morrell: Does this make sense?

Interviewees: Yes.

S. Morrell: Okay. So, was there, a sort of like a comfy, a warm nice comfy feeling about working in a group?

Diane: Yeah.

Mary: Well, you know these people, so it's easier, if you don't understand they may not either and you can find out if they don't either.

S. Morrell: So it is a lot better feeling in a group then, like in a small group like that, than in a classroom situation?

Mary: Yes.



S. Morrell: Wendy would you agree with that?

Wendy: Yes.

S. Morrell: How about you Taylor?

Taylor: Yes.

Diane: Can I ask you something?

S. Morrell: Sure you can.

Diane: I noticed that working with Mary ... in a classroom situation, I felt like a lot of people knew more than I did but really when I was in the group working with people that I thought were really, really smarter than me, they were having the same problems that I was having.

S. Morrell: Oh really.

Diane: So it made me feel better.

S. Morrell: Oh.

Diane: But I mean... you know.

Wendy: Which means we feel better than most people.

Group laughter

Diane: NO! I didn't feel as stupid! You know like ...

S. Morrell: That's what I was just talking about, right?  
In a class ...

Group agrees, still laughing and all are talking at once.

S. Morrell: I don't want to raise my hand and ask a question because so and so would see me and ...

Diane: Oh no, it's not the fact that, I just ... like ... I noticed like with your class I felt that everybody else understood like and some things I would understand and then other times ...

S. Morrell: Sometimes that was just a matter of them leading you on I think.

Diane: No. (disbelief)

S. Morrell: Yes.

Diane: No way! (laughter)

S. Morrell: You'd be surprised. That's why there's no such thing as a stupid question in my classroom.

Diane: I know. But I don't know...

S. Morrell: It's true. I don't say it for no reason.

Diane: I know but like...sometimes you're kind of ...

Mary: Think you're gonna ask us something.

Diane: Yeah!

Mary: Please don't ask us.

Diane: Like just the way that, like ... your ... like your voice or something.

S. Morrell: Laughs

Diane: You know like, you look at somebody in front of me and ...

S. Morrell: Or whatever, I don't know.

Diane: No, you sound as if ... you know, like your not ... I don't

know.

S. Morrell: Finish your sentence. Express yourself.

Diane: Laughs.

S. Morrell: You're nervous so.

Diane: Yeah.

S. Morrell: You're among friends.

Taylor: Well okay. I didn't feel as good, you know. Like I just think I feel ... I don't know... it's really weird, I didn't feel like I understood and so I didn't want to ask questions because I felt that you would say: okay well you shouldn't be here. You don't understand.

S. Morrell: I've never said that to anyone.

Diane: You said that at the very beginning of the year, you said if you don't understand this stuff then you're in the wrong class...

S. Morrell: Okay but I never said it to a student.

Diane: Oh no! Oh no!

S. Morrell: I said it to the entire class.

Diane: I just felt that you might say that or something like not, not just to me but like something like, you don't understand, what are you stupid? (Laughing).

Conversation is muffled, laughing ...

S. Morrell: I never done that in class either.

Diane: No but that just not the only one I ... I don't know.

S. Morrell: Are you saying that I'm giving you that impression?

Diane: Yes.

S. Morrell: Okay.

Diane: No, no but you're a nice person and all like ...

S. Morrell: I'm just leading you on. See you all thought I was offended. Didn't you? I guess I should be an actor.

Taylor: No.

S. Morrell: Geez, all these shots. I'm not sure I'm gonna... (group laughter) I'm not going to be surviving... (group laughter).

Diane: But you're a great teacher and a person.

S. Morrell: Oh thanks. You want something, I can tell. (group laughter) Let's see, she probably thinks I'll get her moved out of the Pathfinder group (laughs).

Diane: Nope (laughs).

S. Morrell: Were there times when you needed further explanation of the concept and when? In other words... this question in a sense leads to the next question which says: were there times when you needed assistance? In other words, were there times when you were working in your group all by yourself and the module and textbook just didn't do you any good and there wasn't anybody in your group when you were talking about problems enabled you to come up with a way of solving the problem in a proper mathematical way. Were there times like those? And if there were times like those, did you then go out and seek a teacher to give you the assistance that you needed? How do you feel about that Mary?

- Mary: Yes, there were times when I needed further assistance so if I couldn't get it from my peers then I would go to a teacher and it usually happened in the problem solving.
- S. Morrell: Within the exercise? In other words like as I was telling you before, there was an explanation, practice, guided, explanation, practice, guided and then an exercise and while you were working your way through that exercise ...
- Mary: That's when I'd have the problem.
- S. Morrell: Somewhere towards the end?
- Mary: Yes. When the problems got more difficult.
- S. Morrell: Okay. Where there were no more ...
- Mary: guided problems.
- S. Morrell: No more guided problems to give you assistance.
- Mary: Yes.
- S. Morrell: Would anyone change what Mary has just said? Would they like to add anything?
- Wendy: Sometimes when I got to the more difficult questions that's when I needed the help. Sometimes when I got to a difficult question, and I didn't understand it and I went and I tried to figure it out and I went to the teacher or a peer for help, later on, after I had been taught how to do the question, I noticed that it did explain how to do the question but most of the time I just wouldn't be looking. It did explain it and did show us but I just had trouble catching on.
- S. Morrell: You're saying that these times that we're talking about here, the times you sought out a teacher, were

these extensions of ideas and concepts that were taught either in the explanation or the practice problems and guided problems, is that what you're talking about?

Wendy: The problems I didn't understand?

S. Morrell: Yeah, and they either required you to do an intermediate step or something else before doing the actual work or that sort of thing; is that what you're talking about?

Wendy: Yes.

S. Morrell: Would you agree with that Taylor?

Taylor: I don't understand.

S. Morrell: The time that you needed the teacher or a teacher would be the time when the problems when you looked at them closely enough they weren't really that much different than the actual problems that you had to do in the practice exercise?

Taylor: That happened quite often.

S. Morrell: Like was ... like a maze, you needed to do a right hand instead of a left hand.

Taylor: I just had to read it more carefully and think about it.

S. Morrell: How about you Diane and Mary? How do you two feel about that idea?

Diane and Mary agree.

S. Morrell: What would have to be done then to enable you to eliminate the teacher all together? Or would it be possible to develop a module where you wouldn't need the help of the teacher? Taylor?

- Taylor: It's hard to say. It depends on the person. Because if you working through it quickly and you don't really connect those things then I think you're gonna need a teacher's assistance.
- S. Morrell: Okay. Wendy?
- Wendy: I think the same thing. I think...some people ... just the way they learn, they learn better with a teacher, like then just by themselves.
- S. Morrell: How about you Diane?
- Diane: I think it depends on the person but I think if you were put more guided problems in there then it would help everybody, you know like...
- S. Morrell: Okay, but what I'm talking about is like right now you were talking about problems that are essentially are the same as the other ones you were doing by yourselves. It's just that they may require you to do an extra step or maybe require you to do some work before you do an actual solving which they call an intermediate step. So, those problems are the ones that you require the teachers assistance ... is there any way that you can be prepared as a math student so that you wouldn't need the teacher's help? I guess is what I am asking. How about you Mary?
- Mary: I think it depends on the person but if you know your basics well enough, maybe if there were more guided problems as questions ... questions that you needed help.
- S. Morrell: You think if you could have some guided problems that were along the line that you needed the teacher's assistance for, that would kind of help. (Mary agrees)
- How did this type of instruction make you feel about mathematics? In other words, we talked about it

being more uncomfy in classes than groups, right? You felt secure in there, that you realised some things, like Diane realised that there were some people who she perceived as being very smart but really they were having the same trouble as she was having. So, did this type of instruction make you feel awkward or did it make you feel better and why did it make you feel awkward or worse or better? Taylor?

Taylor: Well, it made me feel a little better because ...

S. Morrell: Did you feel any pressure?

Taylor: No.

S. Morrell: You don't think maybe that's the reason. There was no pressure like in a regular classroom situation it's gotta be done tomorrow or the day after.

Taylor: Oh, I liked that better although it did have to be done...at the end of the week.

S. Morrell: There was no real pressure in terms of you doing it everyday. it's up to you to sort that out. Nothing else?

Taylor: No.

S. Morrell: You're gonna have to have someone like a teacher, an adult God forbid, tell you what you had to do or how to do it or ...

Taylor: I don't like that.

Interviewees: Laughing.

S. Morrell: So that could be perhaps another reason then why you like this instruction?

Taylor: Yeah.



S. Morrell: Okay. How about you Mary?

Mary: I felt better about Math and awkward at times. I felt better than, you know that people feel the same way as you do about it and I felt awkward that ... I could learn more in the classroom.

S. Morrell: Okay. Why were there times when you felt awkward?

Mary: Because I didn't understand as well as I might have in a classroom situation. I don't understand how they would ...how you ... how you would (ah) ... what you're doing wrong.

S. Morrell: Frustrated that there were times when you couldn't have figure it out yourself, and you know there wasn't anyone right there to give you assistance?

Mary: After a while. You'd try it until you ...

S. Morrell: Give up?

Mary: Silent confirmation.

S. Morrell: Would it be a short period of time over which you would try it by yourself or would it be a long period of time say would it be about five minutes. Would you give up after say 2 or 3 attempts or would you give up after 5 or 6 attempts or when you're really frustrated after 9 or 10 attempts. What would you say?

Mary: Maybe 5.

S. Morrell: After 5? How about you Diane?

Diane: It made me feel better.

S. Morrell: It made you feel better? How did it make you feel better?

Diane: Well knowing that everybody else had the same problems that I did, in some areas ... you know.

S. Morrell: You felt better because of the relationships...the peers, the friendship you shared?

Diane: Yeah. It made me feel good about my friends, the usual friends.

S. Morrell: How about you Wendy?

Wendy: About this type of instruction? Afterwards when you were done it, and you look at it and you feel like you did it yourself. Well even though I did I did get some help on it though.

S. Morrell: Do you think by yourself is ...

Wendy: What I like doing...what I like when I do it myself and I do it right.

S. Morrell: Okay. So you'd rather find your own way. Is that what you're saying?

Wendy: Well I think the only reason for me is cause when I ... when I work it out for myself, I can understand better and remember better.

S. Morrell: As opposed to someone lecturing to you?

Wendy: Yeah, I understand better...like ... the other kind, well, I'd rather find out how to do it myself.

S. Morrell: So you prefer to experience something rather than...?

Wendy: I think that I learn better that way.

S. Morrell: You think you learn better?

Wendy: I feel I learn better that way.

S. Morrell: When you were finished, did you like... did do you feel like you understood the concepts? In other words, before you wrote, for example the test, remember the test that covered ... the modules, you know? (confirmation) Before you wrote the test... you had written two quizzes, one for each of the modules, did you feel after, sorry before you wrote the test, that you understood what you needed to understand for that segment? Taylor?

Taylor: I felt that I understood it all until I got the results back from the quiz.

S. Morrell: Before you went into the test then, you didn't ...

Taylor: I thought I understood it all.

S. Morrell: Before you wrote the quiz you thought you understood it all.

Taylor: Yeah.

S. Morrell: Why did you think you think you understood it all? Because ...

Taylor: Why? Because I did fairly well on my assignments.

S. Morrell: Wendy, Diane and Mary would you change that answer or would you add to it at all?

Diane: Just before I went into it, I kind of knew I understood it, like I thought I did but as soon as I looked at the stuff and they were harder problems and stuff.

S. Morrell: You felt that the quizzes and the tests were harder than indeed the regular exercises?

Diane: Yeah. Just because it was a quiz or a test. I have

trouble to concentrate.

S. Morrell: Do you get a little up tight about quizzes and tests?

Diane: Yeah.

S. Morrell: Wendy and Mary would you change what Taylor said about ... you thought you understood until you wrote the quiz and you thought you understood before you wrote the test?

Mary: Not really.

Wendy: Yeah. I thought I understood it because I also had done enough.

S. Morrell: The reason why then would be because of what you did on your own? We all know here though that you didn't do well on the quizzes, as Taylor has mentioned you did not do well on the test. The whole class didn't do well on the test. As you feel that you understood the concepts, can you field me some explanation as to why you would have had that ... why there is that difference, that big gap that exists between what you thought you knew and what you really demonstrated on the quizzes and tests? Taylor?

Taylor: Well, I thought I knew it because, like you said I didn't study. Because the only reason I did well was because ... like falling back on the guided problems and sample problems.

S. Morrell: Did you study for the quizzes, or the test?

Taylor: Not really, because I wrote it right after I was finished the module.

S. Morrell: How would you ...would any of you three change what ... what Taylor just said about what her approach was?

Wendy: I agree because ... I noticed when I wrote the quizzes and tests, it seemed a lot harder because I...I think that I depended on the module.

S. Morrell: So, you depended too much then on the modules?

Diane: On the guided problems and explanations.

S. Morrell: Had any of you planned ... studied for the quizzes? You finished the module, wrote the quiz and that was it, you never sat down to ... go through everything.

Diane: I looked over my modules for my test and that was it.

S. Morrell: That maybe you should have done some studying? Even ... I know this was done in a week.

Taylor: I don't think that it would have been different.

S. Morrell: Not at all?

Diane: I think if I would have ...

S. Morrell: Well wouldn't you ...

Diane: Not even if ... No! Because like when I was done my module I thought I knew it. You know.

S. Morrell: So that's what you would expect.

Diane: Yeah, so like I could...

Mary: For the test I think, it would have been better to study because then you got your quiz marks back and you can see what you did wrong and then you kind of understand it more. It helps study for the test. If you didn't do it after you done the module.

S. Morrell: What would you have to do, what would a student, I should say, have to do?

Diane: Not rely on the guided problems and explanation.

Mary: As much.

S. Morrell: Would that happen to be the instructions given by me as a teacher or an instructor or ... ?

Diane: Even like take the guided problems away, like give the module in two separate things, you know like. Give the explanation and the guided problems let them work through that and get them to hand that back in and they can't get their next part until they give it back in. And then give the exercises and then give it all back to them. See that they went over wrong, fixed up or whatever they have to do and then take it away and write the quiz or the test. I think that would help a lot.

S. Morrell: How about the other three of you?

Taylor: I agree.

Mary: Yeah

Wendy: I think it would help.

S. Morrell: Do you think that would help?

Taylor: I think it would have help ... I think would it help me a lot more, because I would have had to understand it.

Wendy: You would have to agree.

Mary: You can't go back to consult your module.

S. Morrell: That sounds good. Great! Would you recommend this type of instruction to other students? Taylor?

Taylor: I think I'd recommend it if the changes were made, but until then I think they would probably try and get off

easily.

Diane: I'd agree with Taylor.

S. Morrell: What about you Mary?

Mary: Yep. Until the changes were made but right now I'd say it depends on ...

Wendy: With or without the changes I think it would have to depend upon the person.

S. Morrell: You as a person before you wouldn't recommend then you'd say to that person would you find out first before or what?

Wendy: Oh yeah, yeah, I think so.

S. Morrell: In other words you're not just going to say do this because it's neat. I can get your exercises done and get an 80 or 90% on your assignment. That's what you're saying?

Wendy: Yeah.

S. Morrell: You wouldn't do that, you'd say, there's more to this then...you would have know whether or not that person...

What changes would you suggest in order to improve the modules? I guess we have but I need specifics. Remember now what we're talking about here is if you have the opportunity to affect all future grade 10's, because this module is given out to them. If you were ... If I was to give you this module and ask you to go away and come back and tell me what has to be changed or if there is anything has to be changed. The next grade ten group, what would it be? Diane?

Diane: Give them a two-part module and that would do it a

lot like ...

Mary: Your explanation and your work and then take away the guided problems once they have gone through them.

S. Morrell: Would they get to use the explanation on them?

Diane: I don't think so.

Mary: I think the explanation.

Wendy Yeah. If you took the explanation and guided problems being taken away, it also ... it almost force them to figure how to do it or try to remember how to do it.

Diane: That's what I think I think that's what I would rather do.

S. Morrell: Okay. So I need to get this, make sure I understand you. What you're telling me is that I give them a module and in that module would be an explanation, a practice problem or problems, right (confirmation) and guided problems, right? (confirmation) Now, they've worked their way through these, right? Then they hand it in to be corrected, is that what your saying or someone corrects that, and then after that, they hand that in not to get it back?

Diane No.

S. Morrell: No, just a second, I'm not finished. Let me finish. Then when they hand that back in to say me or some other teacher, they get a second part to that module, which is actually a sheet, let's say, listing the exercise and problems that they are to do in that exercise... is that what you're saying?

Diane: Sure.

S. Morrell: And then when they're finished of their exercise they



are to... then what ... can they get their first part back to see if they did it right or...?

Diane: Well, they mark them, get them all marked and everything and give them the whole package back. Look over, like and see what they're doing wrong, if they're doing anything wrong, work out their flaws and all that kind of stuff, take it away and let them write their quiz.

S. Morrell: What you just said though, would do you that after the quiz or would you do that for every exercise in the module?

Diane: Right before the quiz, like give them their problems, the explanations and the guided problems, take that away and give them their sheet of exercises ...

S. Morrell: They would do them, then they get the next part to that ...

Diane: They mark those, then they get the next part to them, like the guided problems. Yeah. And work all that. Then take away all of the module ...

S. Morrell: And the same thing, the process all over again, right?

Diane: And write the quiz.

S. Morrell: And then ... okay. Now I get it. All right, how about the rest of you? What would you think?

Taylor, Wendy & Diane: I agree.

S. Morrell: You think that would be the only change?

Diane: I think that I would have done a lot better.

S. Morrell: Earlier didn't someone say something about more guided problems, would that... ?

Diane: Yes, more guided. But not of like of... like of the beginning of them. Yeah. Like more harder.

Wendy, Mary and Taylor agree.

S. Morrell: So like, let's say, there are three levels of mathematics problems in the exercises called A, B, and C. "A" being easiest, "B" being mediocre to hard, and "C" are hard.

Diane: Yeah. Give one for "A", two for "B" and definitely two for "C" I think.

S. Morrell: That sort of thing?

Taylor: I agree.

S. Morrell: Any other changes at all?

Diane: None that I can think of.

S. Morrell: Just before this and before we finish this interview, you mentioned before that quizzes and test seemed to be harder, you said seemed I think is the word that you used.

Diane: Yeah.

S. Morrell: My question is: when you say "seemed" do you mean that the tests and quizzes were unfair and that they were harder or that now that you look back they're actually same, but because you relied on certain things including the module and you didn't have them to go over before the quiz and test you were at a disadvantage and that's why they seemed harder, the quizzes and test?

Diane: I think ...

S. Morrell: Unfair or...?

Diane: Oh no, they weren't unfair but I think some of the questions were a little bit harder but when you think about it, looking back, if you wouldn't have had the guided problems to rely on. I know myself if I wouldn't have relied on them then I wouldn't have been able to do them, like.

S. Morrell: I guess I didn't make it very clear and that is that if you wouldn't have used the guided problems in the module as a crutch because you were propping yourself up with them and, that you probably would have done better on the quizzes and tests?

Diane: Oh yeah. For sure.

S. Morrell: Would any of you disagree with what Diane just said?

Interviewees: No response.

S. Morrell: Anything else to be added or kill the teacher who made the module or ...? Any more comments?

Interviewees: Laughing.

S. Morrell: Okay. Great! Thank you very much.

S. Morrell: All right, this is the second group, the males participating in the individualised mathematics program for trigonometry at the grade 10 level. The two gentlemen in this group are Jack and Vinney.

Let's start this out with the interview questions that I have given you guys to look over.

For question 1, it says: what type of attitude do you have about this type of instruction before you started and why?

Vinney could you start us off.

Vinney: Well, my attitude going into the module, I had heard from peers and friends that the modules were going to be tough and I thought, oh no, it's going to be really tough and hard to do. But once I got into it, it's wasn't as bad as I thought.

S. Morrell: Okay, so your whole attitude then was set up by your peers when you say that?

Vinney: Yeah.

S. Morrell: What did you think Jack?

Jack: Well, everybody didn't always tell me... this guy's so hard, he's going to just torture you and you're going to fail and you're not going to pass and all this. You know you get thinking, oh my God, oh my God. Then you get there and it's kind of like oh, well it ain't so bad, it ain't so bad, I think I'll pass, I think I'll pass. You get your marks back and you're thinking it's not as bad as you thought. They were good.

S. Morrell: Okay, so your peers again had a major effect on you?

Jack: Yeah.

S. Morrell: Okay. Did your attitude change during the course of working through the module? I guess you've already answered that too I guess.

Jack: Yeah, like once you really got into working and that and going through your module it wasn't as hard as you thought it was and had been led to think and all that.

S. Morrell: So did it improve a great deal or just a small amount?

Jack: A good deal.

S. Morrell: What about you Vinney?

Vinney: Yeah, I thought it was more easier than what they had set me up as thinking. There were some parts that were tough but not as tough as I thought the whole thing was going to be. Generally it wasn't that bad.

S. Morrell: So, yours improved for the better too?

Vinney: Yeah.

S. Morrell: Okay. So, how would you explain the change? Just a matter of degree of difficulty; is that what would be the only reason?

Jack: Yeah. I guess some people, you know, they make the work harder than they think it should be and they think it is. Well, if you're kind of thinking it's easier then it's me you can work through faster and you're going to think oh, it's not as hard as it is.

S. Morrell: Okay.

Vinney: I had set myself up for it being really really tough so it kind of caught me off guard when I first did the first few questions thinking it wasn't as bad as I thought so I had to kind of stop and adjust.

S. Morrell: So you had set yourself up for improvement you'd say?

Vinney: Yeah, I had set myself for harder questions, trying to get through them and when I found out they weren't as hard as I thought they were at first then it kind of helped me out a bit.

S. Morrell: How much time approximately did it take you to complete the module? Approximately, I mean like if you had to say the number of hours would you say it took you, six to ten hours or ten to twelve hours or what would you think about that Jack?

Jack: About ten to fifteen I'd say.

S. Morrell: Is that including your quizzes and tests or just the (Jack interrupts) ?

Jack: No, just the work.

S. Morrell: Just the work.

Vinney: I thought it was basically the same for me too. I'd spend a lot more ... like I went over it a few more times but that might have been less.

S. Morrell: Okay. Did the explanation in the module prepare you for the exercise?

Jack: Yeah, it prepared me pretty well. Like ... it started you off so that you were just kind of looking at examples and you know you started on small problems that were easy. It worked you up. It was nice cause then you didn't just go straight into it and not have any idea what you were doing.

S. Morrell: Okay. Did the explanation before the examples help you or not? Or was it just the examples themselves that was more beneficial?

- Jack: I think both of them really helped like the examples and the information we had been given.
- Vinney: I thought the examples helped me out a little bit more cause then I could see and picture what I was doing and ... it'd prepare me a bit ... the exercises easier like.
- S. Morrell: What did you think about the examples, were they , well let's bring in the textbook, did you look at the examples in the textbook prior to the exercises like before each exercise is an explanation, an example of problems that are going to occur in that exercise. Did you look at those examples and if you did, how would you compare that to what you found in the module itself?
- Jack: I only looked at the examples a couple of times. I thought the module pretty well prepared you and you didn't have to look at that, you know and I just left it at that basically. I didn't have to compare or anything.
- Vinney: I looked at both examples in the textbook and in the module cause I looked at the ones in the module first and then started the exercise and the first few questions that I did I had a few problems with it then I went back to look at the textbook and it helped me out more than what the .. just a little bit.
- S. Morrell: Okay.
- Vinney: Little parts of it helped me out different in different ways than what the examples did in the module.
- S. Morrell: Okay. What part of the module prepared you for the exercise and then the second part to this question says what part did not prepare you? In other words if you had to look back in the exercises that you were asked to do were there parts of the module that prepared you for what you had to do and is there a part

to the module that did not prepare you for the exercise?

Jack: I'd have to say that the exercises that you were given were well prepared and that and prepared you really well for your questions that you had to do from the book.

S. Morrell: Okay.

Vinney: I thought that all the parts of the given information had prepared us for this pretty much and that we didn't really need anything else.

S. Morrell: There wasn't anything else?

Vinney: Wasn't really. No. I thought it described it pretty thoroughly.

S. Morrell: Okay. Did you work in a group or individually and when? ... What do you think about that Vinney, did you work in a group of people?

Vinney: Yeah. I worked in a group of people most of the time cause I thought it was easier to get more people to think about it.

S. Morrell: So, most of the time, like you ?

Vinney: A majority of the time I was doing the module I was probably working with a group of people.

S. Morrell: Okay, so like when you started working, when you decided to work on your math you would automatically go to the group, is that it?

Vinney: Or, a group of us would say, hey, let's work on our math module and we'd each do a question and compare answers and stuff. That's how we thought it went.



S. Morrell: How about you, what do you think Jack?

Jack: Ninety percent of the time we were in a group and you'd definitely know if you had a small problem, you couldn't understand something, then you know someone else could help.

S. Morrell: So, it wasn't a matter of you running into something difficult right away but rather you just ... (trails off)?

Jack: You could sort it out, you know. If each person got just a little part of the exercise right then helped each other you know eventually you'd understand it all you know. Coming from... if you know the person really well, sometimes it's easier.

S. Morrell: Yeah, so it's sort of like a support group in a sense?

Vinney: Yeah, like say you got a certain part wrong and a person got that part right but he had another part wrong, and you had it right, you could help each other out with the different parts and eventually get the right answer.

S. Morrell: Okay. Jack, I think you've answered this next question, how much time percentage wise did you work alone and in a group? So, you said about ninety percent of the time you worked as a group but what about the other ten percent of the time?

Jack: That would just be basically like sometimes somebody else might not exactly be doing math so, I'd just do math.

S. Morrell: That would be your individual? Did you ever approach a teacher for any help?

Jack: Yeah, I approached a teacher a couple times.

S. Morrell: If you had to split this down, you'd say 90% as a group

right? Then the other 10% how would you break that down between say teacher and individual?

Jack: Five percent each.

S. Morrell: Five percent each?

Jack: Five for teacher and five for just individual.

S. Morrell: Okay. How about you Vinney?

Vinney: I thought well, again I thought 90% if it was with a group but I thought I did a little bit more work, I didn't go to the teacher as often cause it was pretty much ... I'd maybe say 7 and 3 or something just off ... just like ...

S. Morrell: So 7% individual and 3% teacher?

Vinney: Yeah, cause I did a lot, well I did most of, like I'd start every exercise, do the first few questions and then I'd finish the rest off at home or something if I didn't have time.

S. Morrell: Did you do a lot of work at home?

Vinney: I did. Well, I did most of it, the module at the school but the parts like the exercises and stuff like that I did most of them at home. Most of the booklet, well actually, basically all the booklet was done in class with our peers.

S. Morrell: Oh yeah; What about you?

Jack: I never took the book home. Yeah, I did it all in school.

S. Morrell: You did it all in school?

Jack: Right.

S. Morrell: Did working as a group help you better understand the concepts? Okay. I think you've sort of answered this already but let's get this clear what we're talking about here; it says: did working as a group, okay now when you're in your group and you're working together, did that help you understand the concepts you were asked to do, or learn better than if you had to do it individually?

Vinney: Yeah, because when we said that it would help, like when we said that. See I got one part right and Jack got another part right. We could compare the answers, so we'd get it faster and easier.

S. Morrell: Okay. So the why then would be the fact that you're able to rely on your peer for assistance.

Vinney: And comparisons and stuff.

S. Morrell: That would be what you'd say Jack?

Jack: Exactly.

S. Morrell: Okay. Were there times when you needed further explanation of the concept, in other words even as a group, it didn't seem to make any difference ... the concept, you just couldn't get it; it wasn't really clear to you, whether that be the explanation or not? But were there times when you needed a better explanation or a further explanation?

Jack: Yeah and that would basically be a time when I'd see a teacher.

S. Morrell: Okay. So that would be your five percent that you were talking about?

Jack: Yup.

S. Morrell: Now were these concepts, were they, ... they were just

difficult concepts or you just had a problem trying to under..., perceive how they were supposed to be?

Jack: Basically ... a problem how, ... how they were suppose to work and that. And sometimes you wouldn't just be sure like you might get a couple of answers wrong and he'd keep getting them wrong, so we asked why are you doing this and that wrong.

S. Morrell: Okay. What about you Vinney?

Vinney: Me, it was when I had set up the question and I'd done something wrong and then when I went to correct it I'd keep setting the question up the same way and just changing things around it wasn't getting right so, I'd go to the teacher...I'd go to the teacher and he'd show me the right way in which to set it up and then that's probably where most of my problems occurred.

S. Morrell: Okay. So...so what you were doing is using a... sort of like ... you said the pattern was this and you stayed with that pattern?

Vinney: Yeah, I stayed with the pattern but the pattern was wrong so I'd get the question wrong no matter what I did.

S. Morrell: Okay; that would be the 3% of the time that you needed assistance as well?

Vinney: Yeah, I'd go ...

S. Morrell: Were there times when you needed assistance from the teachers, well you already said that 3% of the time and 5% of the time for Jack. Vinney, were these difficult concepts that you were having trouble with or was it just a matter of just as you said the setting up of, as you said, the setting up?

Vinney: Yeah; most of it was setting the questions. One I think

was, or a couple of them come to mind that I didn't really understand the concept quite clearly enough and my friends couldn't really help me out that much so I came to the teacher and he kind of cleared it out for me.

S. Morrell: Okay. What about you Jack?

Jack: Well, if you kept getting stuff wrong, you couldn't understand sometimes... it was something I might be missing ... like in this situation, you had to do something different ..., that's basically what would be happening.

S. Morrell: So, if the problem had a little twist in it or something different than what you had been doing in the previous part of the exercise is that when this happens?

Jack: Yeah.

S. Morrell: Okay. How did this type of instruction make you feel about mathematics? I think the key word here is feel in other words did it make you feel good, did it make you feel stupid or do you...ya know ... how did it make you feel when you were working through this kind of ... as opposed to say a classroom or some other type of instruction? How did this make you feel? Vinney?

Vinney: I thought it made me feel just a little bit better because I was basically...well the stuff was there just that ... but I thought I was teaching myself more than getting it dictated and taught to me so I thought I was doing better ... I was teaching myself so... I thought I was maybe ...

S. Morrell: So, you felt better overall?

Vinney: Yeah, cause I was doing the work.

- S. Morrell: Okay. What about you Jack?
- Jack: I liked it. I thought I was really good because ... it was like... Really good an' all cause you know, you actually had to do the work by yourself. It wasn't just you being helped all the time and it was teaching you like to be aggressive and that and really get things done. Which was good.
- S. Morrell: Okay. When you finished, did you feel like you understood the concepts and why? Did you think you understood the concepts and when you were done each of the modules? I'll say it again, did you think you understood all of the concepts that you were supposed to know?
- Vinney: I thought I understood the concepts, well ... all of them, ... but I guess there was a couple that I didn't understand that I thought I had done right ... that I'd done right but I had done the work differently. So I had gone to the teacher and after writing the quizzes and stuff finding out I didn't do it right so I'd done it over again and found out.
- S. Morrell: So, why would that be, why, why?
- Vinney: Well, when you're teaching yourself and you get an answers right you think you're doing everything right but you might be doing some things, little things, different and getting like a fluke answer or something right.
- S. Morrell: Right. Okay, so what you're saying...I'm trying to get this...what you're saying is that you worked your way through the module. Right? And you thought you were doing everything right because you were getting the answer right ... by the back of the book?
- Vinney: Correct. Yeah.

S. Morrell: But then when it came time to be evaluated, what you doing wasn't actually necessarily correct?

Vinney: No, I'd make an adding error or something when I was doing the module which caused me to get the right answer or I'd do something at the end right or change little things, and that would make ...

S. Morrell: ... as a couple of mistakes that would counter one another then?

Vinney: Okay.

S. Morrell: Okay. How would you ... now ...why would it be then that you'd be able to get yourself... why would it be that you'd be able to get all the way to the end before finding out whether or not? Do you understand what I mean?

Vinney: Not really.

S. Morrell: Okay. You're working your way through your module right?

Vinney: Yeah.

S. Morrell: And you're feeling good because you're doing work right? And it seems like you're doing it yourself. Right? This is all that you're going on as you said before?

Vinney: Yeah.

S. Morrell: And then, you would take a quiz and you'd fail or whatever.

Vinney: Or don't get a high percentage.

S. Morrell: Well right. How is it that you're able to get through the module without knowing that you aren't doing

something right? Do you know what I mean?

Vinney: Well, me and...

S. Morrell: Like, is there a way, I guess I'm asking, is there a way that you could have gone through the module, or anybody gone through the module and known that they were not doing things the way they should have been doing before they got to the end?

Vinney: From my personal experience, mine just happened with the tougher, you know, harder questions.

S. Morrell: Right.

Vinney: So, I could have been getting all the, let's say the first three quarters of it, getting it all right and knowing it was right and getting the teacher to check it for me but when I came to the last few questions, thinking that I had the first ones all correct and everything and getting those ones and doing little things wrong ... like you said, mistakes countering each other.

S. Morrell: Right.

Vinney: That would have caused it.

S. Morrell: Okay. What about you Jack? Did you feel like you understood?

Jack: Yeah. I felt that...

S. Morrell: Before you wrote the quiz, before each of the modules, did you think you understood what you had to know from each of those?

Jack: Yeah. I thought I understood the concepts pretty well before I wrote the quiz and I did okay on the quiz. I didn't do wonderful and all that kind of stuff.



S. Morrell: But that's not typical.

Jack: That's normal really. Like nothing can totally prepare you for a quiz there's... you know there's always something that you might not quite understand the last minute you totally forget, you know, there's also the thing people some people freeze up when they hear test or quiz and they could have studied for hours and then it's just gone blank.

S. Morrell: Okay. Now in terms of the why here, why is it that ... you thought you understood ... but you didn't understand it well obviously based on the evaluation. As you should have, as you thought you did? Does that make sense?

Jack: Yes.

S. Morrell: And as I was talking to Vinney here, I think you had something to say, what do you think about that? What do you think about, is there a way or was there a way that we could have found out whether or not you fully understood all the concepts before writing the evaluation?

Jack: Yeah. Some of the work, you weren't provided with an answer until you had finished the total module...which meant you know, that if you had done that part wrong, a couple things, you might not get that right and therefore you know, come quiz time you might get that wrong.

S. Morrell: This part that you're referring to, what part is that?

Jack: It's the last one ... or there's a couple that the answer that did ...

S. Morrell: This is not the guided problems ... you're not referring to those right?

Jack: No. There was just the ...

S. Morrell: You're talking about the entire exercise that there wasn't an answer for?

Jack: There was just a couple exercises through the whole thing that didn't have an answer.

S. Morrell: Okay. All right. The thing I would like to ... mention here is that you, you didn't do well, I mean, as a whole and you thought you understood the concepts and there seems to be a conflict there as to why that should be the case. Do you understand what I'm trying to say to you?

Vinney: Well, I think that the reason why that happened is because for the answers, you weren't given the answers right. Like I was getting the answers right but doing little things wrong and when I went to do that on the quiz, the mistakes didn't counter each other and little things like that and that's what caused me to get the lower marks on the quizzes and stuff.

S. Morrell: Is there not no other, did you have a crutch? What I mean by crutch, was there something that you depended on a lot when you were doing the modules that you didn't have when you were writing the test?

Vinney: Your peers.

Jack: Yeah, your peers could be a part of it, like sometimes it's just nice to have somebody around and if you're having just a little trouble on the question, just ask.

S. Morrell: Well, another question I had, you talked about having this negative attitude that eventually changed to a positive one at the beginning. My question is, I just thought of this, when you first got the module at the beginning of that week when you started working on

it, did you have a feeling of just wanting to get this done and over with, or?

Both boys: Yeah.

S. Morrell: What was your approach? Was it: I want to get this done, understand it, and be successful? or was it: This is something I have to do and I have to get it done so let's just get it done and get it over with.

Jack: I think it was like a lot of people, including myself, a lot of the time it was just get it done, understand your concepts and hand it in and get on with your week.

S. Morrell: Okay. Let's see. All right then. Now, ... if it was something you had to do and you had to get it done, when you did the module and your attitude improved, you thought you understood the concepts, right? Am I understanding this all right so far?

Jack: Yeah.

Vinney: Yes.

S. Morrell: All right, now, ... what would be necessary... what would be necessary for you to be successful and understand the concepts? Okay, just to say that one more time, if your peers were your crutch and you need to be successful in this unit and you need to understand the concepts what would be necessary? Vinney?

Vinney: Well, I think what would be necessary would be a desire to want to understand the course and do really well in it and progress from there.

S. Morrell: What about you Jack?

Jack: I think you'd probably want to be given more time

cause you time was limited to what you could do really. So, you know you might be thinking, oh if I don't get this done, I'm dead. So, if you were given more time I think you could probably get better results cause you could take your time more and you could also think about the concepts a little more.

S. Morrell: I guess what I'm aiming at is that if you were to have a choice if you could do this over again, if you could do this over again, what would you do differently as opposed to what you did already?

Vinney: Well, I would prepare myself differently and if I could have anything different, I'd probably ask for, again you know, more time. I feel it was too rushed you didn't have enough time to fully understand because you only have a certain amount of time to get it done.

Jack: There was a lot of learning for three days you know you kind you hear something of cram. If you had say five days, you know, you could have had things well laid back a little more and you could have actually taken the time if you were having real problems and go over ... you know, again and again, instead of maybe just once and thinking that you had it right, you had it down pat.

Vinney: You had no time to go over it again, so.

S. Morrell: Okay, last question. What changes would you suggest to improve the module? Now, no holds barred, what would you want to do? If you had to take this as a starting point, what more could you see that would, let me put it this way. Let's say I hand you the responsibility of taking the module as you dealt with them and now it's your responsibility to make up the next set of modules for the next grade 10 that come through. What would you see would be necessary or is there anything necessary that you would like to see?

- Vinney: Well, I thought that the time was a big key to whether... I took...I the modules success, I guess, you could say. The more time I had then the more I thought I could do, the more I took the time to actually read it over a second or third time and do the work over. The way it was set up is that you never had that time, you had other things to do.
- S. Morrell: So you would like to actually see the modules, I guess what you're saying then is that because we are stuck with it that one week right, I mean we don't have much choice on that. So what you're saying is decrease the amount of material for the module?
- Vinney: Well, maybe decrease the exercises, I found some exercises quite lengthy...
- S. Morrell: Redundant?
- Vinney: Yeah, quite lengthy and repeating themselves. Maybe, do the the, like in some exercises the first few questions are easier than the last few and that say per question say A. and C. are easier...
- S. Morrell: So, remember you have control of this ... I mean whatever you say I'm not going to hold against you. (laughing)
- Vinney: I know, no. (smiling)
- S. Morrell: Okay. So like, you're saying time is a major factor and all I'm saying is that are you saying that what we should really do then is make the module smaller and you said no, instead of doing that just make the number of problems for the exercise less.
- Vinney: Yeah. Instead of making a question 1 A, C, D, E just say maybe A and D, give you one of the easier ones and one of the harder questions.

S. Morrell: Do you think that would be enough?

Vinney: And if they, like still don't understand maybe go over a couple extras, make some so that they are mandatory that they do all say six questions per say per question you had to do six equations, say do, make it so they have to do say three and then the other three are optional if you don't understand it.

S. Morrell: Is that all you'd want to see done?

Vinney: Basically yeah.

S. Morrell: What about you Jack?

Jack: I'd basically go along those lines which ... I'd like that or keep the module how it is and just get an extra week to do it or say three or four days, which would be great.

S. Morrell: Okay. So you don't see anything major really being done to make it better?

Jack: No not really.

S. Morrell: Okay. Would you recommend this type of instruction to other ... students? Now think about that carefully. I guess what I'm asking is that...

Jack: ...would you pick that over...

S. Morrell: ... classroom or what, I don't know, it doesn't really matter what type? I can't think of anything other than that. Other than that. If you were... if a student was to ask you, would you recommend this type of instruction in a module type of thing?

Vinney: Over a classroom?

S. Morrell: It doesn't matter would you recommend this to

another student?

Jack: I'd recommend it to another student but ... what would be best would be to spend 50% of your time in the classroom and 50% with your modules. So you do get time with your teachers. So you do have time to understand the concepts that you don't quite understand and, you know, can also just drop by if you're having troubles.

S. Morrell: Right.

Vinney: I agree with Jack. I think that it's vital to have the classroom time but it's ... in a way, this is good because you are teaching yourself. But you need to have that extra help when you need it.

S. Morrell: Okay. Another question that goes along with that same one about recommending to another student,... is there a certain, are there certain things that a person has to be or has to have in order to be successful with this type of instruction?

Jack: Well, if you work well in a group and you understand even just a couple of concepts real well, and you know how to get through your work and you get to the final test and you do okay. I think that's not bad. And if you know, you don't totally freeze up all the time and you prepare yourself.

S. Morrell: I guess what I'm looking for is something about: do you have to have good work habits or do you have...do you have to be determined, do you have to have a desire to want to be successful and know this material. Or can anybody do this material? It doesn't matter what kind of work habits you have?

Vinney: I think anybody could do this material but the more you want the more you understand, the better your mark will get. If you just want to blow right through

it you might get a mediocre mark but you want to understand it, want to learn it and want to take the time to read over and read through it you could get a really, really high mark.

S. Morrell: Okay. Going back to the other question then about recommending this to friends or other peers or a Grade 10 group who are coming up, would you consider these sorts of things about that person before recommending or would you just simply...

Vinney: I would, I would see ahead, like I know most of them, and how they work. There's certain ones that this would cater to and there's certain ones it wouldn't help them at all.

S. Morrell: Oh is that right.

Vinney: Some of them need the teacher to be there to help them to show them what's not. Some of them could do this and go right through it and basically, like ace it. It's just certain types, certain ones want it more than the other.

S. Morrell: Okay so, would you though, would you weigh whether or not that person has what you thought would ... before saying yes or no. Or would you just simply say anybody can do this or anybody or anybody should do it.

Vinney: I say, I feel ...(cough)... excuse me. You could say anybody could do it but I would tend to go with to catering to certain people.

S. Morrell: Okay. What about you?

Jack: I think if you have really good work habits that's going to help you a lot because that tends to keep you on track more...more focused and other things, like you know. Like if you work well with your teacher and you understand the concepts such as I said before, it's



definitely a bonus and it will help and like wanting is definitely a major.

S. Morrell: A major? A definite want ya gotta have. Okay. I just want to take this one more step farther; we both know that there are major changes in the educational system that are coming up in this province and one of those things is called continued progress ... which sort of indicates that you would work at your own pace. Could you see students being successful in a course set up with modules like this where they didn't have time limits on them?

Vinney: I would think, tend to agree with that. Yeah. Because if you had more time you could read through it more and think about it more and spend more time on it, then you'd have better, or you'd do better and you'd have a higher success rate.

Jack: I agree with that Vinney.

S. Morrell: I just have one question. you don't think that ... no I won't say. Okay, overall if you had to rate your experiences with the module what would you say?

Jack: It's good for the experience.

Vinney: I think I liked it. I liked it a lot because it helped me. It makes you feel better when you can teach yourself something and do good at it.

Jack: And if you like had no time limit it's nice cause then you're setting your own personal goal. It is your motivation which will get it done which means, you know, you are really doing the work. You are not having anybody really help you through it or anybody like just coaching your way through it or gliding your way through it.

S. Morrell: Okay, this is just my own personal ... because I'm an

adult and I'm a teacher, I'm your teacher, what comes into my head is this: if you had to put your class together in one group, and I didn't have any time limits and it was all done by modules, how successful do you think that would be for your class?

Jack: My class ... it didn't have tons of bright people in there but I think if you put people like ... say split up into like people who are having a lot of trouble and people who are understanding a lot, you know then it each, each group is working at their working at their own pace so they know they're not getting left behind then. Rather they'd understand, I think it would work pretty well.

Vinney: Okay. I'm not saying having a totally open free time limit or anything (S. Morrell laughs). I wouldn't give it like say here's four modules, have them done by the end of the year or something. I'd say, if I was going by this type of instruction, say you get your 3 modules, you have to have it done, you need the marks done by a certain amount of time. Say, okay, you can work at your own pace, you might not... you'll get more time than what we got this year. Let's say you got ...

S. Morrell: ... a week and a half.

Vinney: A week and a half, even that would be more than what we had.

S. Morrell: Right.

Vinney: I think that would help a bunch more and that then having a totally free time.

S. Morrell: Okay. So what I'm trying, what I'm, what I'm trying to think is that to what I'm trying think about here is ... you talked about, in some regards during this interview here, about you had to have a want or a desire, is that not right?

Interviewees: Agreement.

S. Morrell: A want or desire to be successful in this unit. Now, you know your peers better than I do, although I probably think I know them pretty good, I don't know, I'm pretty sure that you guys know them a lot better. So my question ... arises from there ... if there had to be a want or desire which you described throughout this interview, do you think that it would work where there wasn't any time limit?

Vinney: I think it would because then if we wanted to get it done you want to learn it , it might go too fast then what some people expect.

S. Morrell: What about the other people? What about the ones that don't want?

Vinney: I think that the people that don't want, have to have a time limit just so they know... cause some people will just coast through it maybe.

S. Morrell: But then wouldn't that be unfair? Let's say Jack, fits in the lower group and he doesn't ... why should I put a time limit on him and no time limit on you?

Vinney: Well, I'm not saying that you have to put a time limit. But say, let's say you both are doing an equal amount of work, you have to have it all done by then.

S. Morrell: Right. So, he'd have the same time limit as you have or you would have the same time limit as him.

Vinney: Same time limit but ...

S. Morrell: ... you could do it faster if you wanted.

Vinney: Right, I could do it faster, want to get it done faster and maybe have a better success rate. If you're given the same amount of time, let's say, that in my group I

didn't have as much teacher assistance as the other group that I think that both groups could equal. That with these modules the way they're set up that ... it's pretty self-explanatory. You can go through it and I wouldn't have as much teacher assistance as they, in the other work groups.

S. Morrell: Go for it Jack.

Jack: I think that a really reasonable time limit is good and what it means is that if you give this person so much work and they don't get it done it means that they're not really wanting to do that course and that, and not wanting to pass ...which means, you know, you can tell who wants to pass and who doesn't. I mean those people who ... who pass and get their work done are the ones who, like ... like want to get done and are just not going to sit there and look at and whine about it, and that, you know. They're going to be the ones who are going to pass and finish the course.

S. Morrell: Okay. Well, I thank-you very much. I'm impressed. Thank you for your your contribution.

Jack & Vinney: No problem.