Moving Out of the Comfort Zone

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The project had just begun, and already Bryan was experiencing self-doubt. Why was he rocking his boat and entering uncharted waters? He is a good math teacher; he works conscientiously toward having his students enjoy math *and* experience success. So, why was he choosing to depart from the safety of his familiar, traditional classroom structure? Why was he now standing in his classroom directing traffic as his Grade 7 students attempted to rearrange their desks into groups of four?

To begin with, the students had come to class unprepared. None had submitted lists for proposed group members, so class time was required to do this. Few had brought new folders or duotangs as requested the previous day. To top it off, class time had been shortened due to a school activity. Bryan had planned to have his students spend the whole period collaborating on an introductory poster activity in which they would identify, discuss and display the purposes of group work. Not only was there less time for this activity but also it had become evident that to keep the students on task, they needed more specific direction than anticipated.

Bryan capitulated. After all, it was Friday afternoon! Perhaps if he supplied the folders and duotangs for the students, they could get organized properly on Monday. Besides, he knew Marie would be there to help. Bryan and Marie were collaborating on all aspects of the planning and teaching of this fractions unit in which students would make extensive use of concrete materials within a small-group learning setup.

What motivates successful teachers to make significant changes in their teaching style? In other words, *if it ain't broke, why fix it*? Good teachers continue to be learners throughout their careers. Not only do they reflect on what they are doing or have done but also they seek alternatives. Current research and literature offer new directions as theories regarding teaching and learning change. For Bryan and Marie, it was a matter of making classroom practices consistent with their philosophical stance. They believe that students must have opportunities to be involved responsibly and actively in their own learning. They also believe that for students to truly understand, and appropriately apply mathematical concepts and skills, they must have concrete experiences in personally meaningful problem solving contexts.

The topic of fractions is notorious for being abstract and difficult. Many students who appear to have achieved success through traditional chalk-and-talk methods have often developed only a superficial understanding. For this reason, it seemed to be an appropriate area in which to introduce an alternative approach. While Bryan's previous use of concrete materials in teaching math was primarily for teacher demonstrations, he perceived that the manipulatives had facilitated his students' understanding. Ongoing use of concrete materials within a small-group setting for a unit in mathematics was a new experience for Bryan and the students.

One month was allocated for this unit. During this time, a major theme, *Out of the Comfort Zone*, emerged. While Bryan used this phrase explicitly on a number of occasions, it was descriptive of both the students' and teachers' experiences. The comfort zone was defined by a number of interwoven beliefs and practices regarding teaching and learning. The path for moving out of the comfort zone was neither smooth nor one-way; the urge to return remained strong.

The students' experience of moving away from what was familiar and comfortable centred on day-to-day personal gain and may be described as *Seeking Immediate Rewards*. From the teachers' perspective, however, concern with short-term personal effects was only one factor. As the innovators, they were accountable for moving themselves and the students out of the comfort zone. This demanded daily self-evaluation of both the practical and the philosophical aspects of the experience. Their movement was influenced by time and confidence, and

may be categorized as *Coping with Time Constraints* and *Looking for Support*.

The Comfort Zone

Most teachers and students operate within a multifaceted comfort zone without being explicitly aware of its existence. Consciousness of this phenomenon occurs when any boundaries are crossed. This project revealed the following comfort zone fronts: curriculum and pedagogy, classroom organization, control of learning, learning resources and evaluation of learning. Movement requires a departure from traditional practices.

A particular curriculum focus tends to give rise to a compatible pedagogical style. When curriculum focuses on product-oriented objectives, pedagogy that produces easily measured short-term results may appear to be successful and is often viewed as desirable. A move toward emphasizing process over product, where the results are less tangible and often long-term, is viewed with suspicion by traditionalists.

Classroom organization sets the tone for learning. The traditional arrangement of desks in rows fosters a nonsocial approach to learning. A small-group arrangement creates a different atmosphere: no longer is talking among students taboo, it is required! Traditionalists view control of learning to be the prerogative of the teacher, who presents and explains the concepts and skills to the students. However, having students work in groups allows them to assume ownership of the learning process. They are held more accountable both for their own learning and for assisting others within their group.

The textbook is often taken for granted as a learning resource. Because of the security it can offer to teachers, students and parents alike, it may be the only resource used. In fact, too often, the quality of teaching is judged on the basis of what page the class is on. The textbook *becomes* the course even though its content may not be congruent with the prescribed curriculum. While a good textbook can be of value, ideally, it should be viewed as just one of many resources used in the classroom. Manipulatives, calculators and other print materials can enrich learning.

Evaluating mathematics learning traditionally has been done through measuring concepts and skills in an objective manner, usually by means of paper and pencil tests. However, learning is also subjective. Assessment strategies that focus on process and include the use of manipulatives and oral reasoning as well as written work result in more valid assessments.

Seeking Immediate Rewards

The second day of the unit began with a pleasant surprise for Bryan. Waiting to greet his students, he braced himself for impending confusion. However, the students entered the classroom, and, without waiting for instructions, quickly maneuvered their desks into their respective groups of four. The novelty of the situation, having two teachers in the classroom and the opportunity for social interaction, seemed to be motivational; certainly the students were eager to try the new setup for learning.

Another novel aspect for the students was keeping two-part logbooks. The first section was used for in-class activities and homework assignments, the second as a journal for personal writing (about group work, the use of concrete materials and sundry comments). Many journal entries indicated students' discomfort with the writing process, both with expression of ideas and spelling and grammar. Despite their difficulties with writing, many students made honest observations and offered insightful comments. To present the experience realistically from the students' point of view, examples of journal entries have not been edited. The students' real names have been changed to maintain their anonymity.

To capitalize on the students' desire to seek immediate rewards, a prize draw was instituted very early in the program. Students earned stamps for their group during the course of a week. A group received an entry for each five stamps earned. On the basis of the accumulated entries from the previous week, a draw was conducted each Monday. Stamps were given rather liberally for a wide variety of student behaviors—literally anything that contributed in a positive way to the functioning of the class (for example, arranging desks quickly and quietly, taking group attendance, working as a group rather than individually, being polite, assisting others, writing in logbooks). Despite the fact that the group prizes were mere token gifts, earning stamps proved to be an overwhelmingly powerful motivator for individual students while strengthening group dynamics.

The students' generally positive attitude toward the group arrangement remained throughout the unit. Their opinions fluctuated, however, depending on perceived personal benefits from day to day. Early on, Bruce commented in his journal, "I think every thing going prity good. Exept some times people act up. I like this more than the ragular class." At the end of the unit, Blair expressed a common opinion, "Today we are finished off your fractions and group

work. I thought the group work was good and I hope that we have it next year.''

Most students were pleased with their selection of group members. In early journal entries, Mike commented, ''Today Rob was the leader. He was very nice,'' and Flora wrote, ''I do like Wally in my group.'' Bonding among group members became evident when a change was made early in the unit. When one girl in Group 4 left the class, Bryan replaced her with a girl who had been unhappy in Group 1, and he transferred one boy from Group 2, the only group of five, to Group 1. Bryan gave the five boys in the group the responsibility for deciding which one of them should move. They found the decision difficult and ended up putting their names in for a draw. Mike's concern was evident when, later that day, he wrote, ''Darcy had to move to group #1. He is so far coping with the group fine.'' Another day, he commented further, ''Darcy is doing fine with group #1.''

Using manipulatives for mathematics was a new experience for most of the students. As a result, these students used play time to become familiar with each of the materials. A certain amount of free play had to be tolerated before the students would use the manipulatives for the intended purposes. The students were inclined to handle and explore the colorful materials rather naturally. They often described the work with manipulatives as being fun. Lois wrote, ''Well, now I learned about cuisenaire rods. Their kinda fun!'' Helen similarly reflected, ''I learned that Cuisunaire block are used for fractions. They are used as telling sizes. It's easy and fun too.''

An unspoken question seemed to develop: ''If we're having fun, can we be learning?'' (Is it OK to have fun while learning?) Some dealt with this uncertainty about the legitimacy of *playing* in math class by differentiating between meaningful and nonproductive types of play. This was expressed by Helen who wrote, ''It is fun to play with shapes and I just learned never to give Amanda any kind of blocks to play with because that is one of her favorite kinds of toys, building blocks.'' While having fun was important, Gloria's comment, ''I enjoy having to do this kind of work,'' suggests that the playing was goal-directed.

Having fun was important, but students gained more appreciation for the manipulatives as they became aware that the latter helped them develop greater understanding of the mathematics being explored. A number of journal entries reflected this attitude. Howard wrote, ''When we used the manipulatives it made the problems easier because it helped us understand them. The fraction strips was probably the most helpful manipulative.'' That some students were initially dubious was reflected by Wayne: ''Today we learned about what maded ⅓, whole, ½, & how to compare other rods. The thing that was fasinating was using the Cuisenaire rods to make it easier to understand. The thing I was surprised about was to talk with my group members and understand fractions much better.'' The visual aspect was appreciated by Lois, who wrote, ''Dividing fractions is pretty easy with cuisenaire rods. I guess it is better to see it than to think it in your head.'' The need for tactile experience was expressed by Shawn: ''Also we got to use little blocks cuisenaire rods bar graphs and stuff like that. Using thing you can Feel is better than just thinking about it because you can see them and Feel them and ther wright there in front of you bye your self you can only think about it.''

Students who previously have had only superficial exposure to procedures and algorithms may become frustrated when they are confronted with the more lofty goal of attaining a deeper understanding of concepts. Evidence of this was indicated by Melanie: ''Right know we are working on fraction bars. I don't understand so I'm behind the group. I don't find the directions straight forward and I just don't get it.'' The need for patience in this respect was recognized by Gloria, who wrote, ''Understanding fractions is a little bit hard. I used to know a lot about fractions but now it is getting harder. One thing I like about groups is that theres lots of things to do. We also worked with colored cubes. Its kind of neat because you get to do all sorts of things with shapes. I learned that its easy once you know what your doing. Not everyone thinks it easy but I think they should give it a try. At first this was hard for me but once you give it a try it can be easy. I just hope everyone gives everything a try.''

Probably the most motivating aspect for the students was the opportunity for social interaction. This enthusiasm was highlighted by Lois, who wrote, ''Boy this was fun! Today I got a double period! Woa dude! This is heavy! I like working in a group. Its totally dense!'' As for the concrete materials, fun was a common descriptor of group work, but there was also a sincere desire to learn, as expressed by Judy: ''I think group work is really fun and eciting. I honestly belive that this group work thing will really work and I'm sure that we will get a lot of work done. . . . This will probably be the best math classes that we ever had.'' She went on to address explicitly

the importance of interpersonal relations by writing, "I love this working in group. I mean this is really fun. I find that working in groups you get to know people better. I think that math class is better now that we are working in groups too bad we cant stay like this forever." Douglas expressed similar thoughts: "Today I am going to write how I like groups better than working by myself. Its better I find it because you can shar ideas and meet new people and become better frends or learn more about them." The benefits of collaborating and sharing the responsibility of learning were often mentioned by the students. For example, Shawn wrote, "When we were working in groups I found it Fun. It was better than working buy yourself because when you do a question in a group you get to hear what everybody has to say and you can discuss it." Similarly, Howard said, "I think it was a good experience, working in groups. It made the work easier and I understood more that we worked together. It helped some people with their listening." Gloria agreed, "Groups are fun to work in because you can help people or they can help you."

The most common complaints about group work were noise and lack of cooperation. This was indicated by Gloria, who noted, "Some people hate groups because its destracting when some group members keep talking." However, this was not necessarily perceived as a reason to quit group work. Lois acknowledged the distractions, but was not discouraged: "I guess it was pretty noisy. The work was a lot easier and we learned to cooperate with each other. I think in the future, we should get into more groups!" Some of the students were unsure about the value of group work in terms of their own learning. This feeling was expressed by Billy, who wrote, "In this section I feel that I did not lern as much as I would if we were not in groups In other words I feel I would have lerned more by myself." Even Judy, who enjoyed the experience, said, "I think learning how to use fractions in a group was fun and I really dont know if I could have done better or worse if I would have been by myself."

At the end of the unit, the students generally spoke favorably about group work and indicated that they would prefer to continue learning that way. Cheryl wrote, "The fractions unit is over and I really enjoyed working in groups. We are now doing ratios and rates and now we work individually. I enjoyed sharing the load of work with others." Endorsement was offered by Mike, in his comment, "Today we are back to normal in math. BORING! I like group work way better. I learn better that way. The group is more better way to learn math."

Before the project, in terms of performance, most students in this class were either high achievers or low achievers. Although this pattern was not altered significantly by the project, it seemed as though the high achievers felt more challenged while the low achievers, despite low marks, felt as though they benefited in other ways. Not surprisingly, the bottom line for most students is marks. Those who did not achieve well on the tests expressed disappointment. Melanie wrote, "I used to think math was easy but ever since the first term my marks are slipping majorly! I don't know why I just don't understand THIS." Shawn related, "We had a test on fractions I thought that I would do O.K. but I didint I only got 48% Not to good at all. I try to study more and do better." Even some students who did well, relatively speaking, indicated that they had greater self-expectations. Rachel noted, "On February 18 we got our tests back. I got 72%. That's okay but is not so great. I don't understand how to multiply and divide fractions yet." Similarly, Lois commented, "Well, I didn't do very well on my fractions test. I got 72% Pretty bad, huh? I hate it. I'm a 70%-80% person. I'm so bad. Why can't I do any better. I guess I have to 'Apply' myself to it."

The disappointment, however, was not directed at the group setup. Gloria lamented, "On the test I didn't do very well. I use to be good at fractions but is differnt now. Some how its alot harder than the years before. I think I need some help with fractions." Shawn, in fact, supported group work in spite of his own performance: "We had a test on Fractions I thought that I would do pretty good on the test but I didint I only got 33% thats not to good but at least I tried. It was a Fun experienc being in groups I hope are class will get to do it again."

On the other hand, some students who were pleased with their marks did attribute their success to working in groups. Blair wrote, ". . . I liked the group work and we should have it again. I liked the fraction unit because I did good on the tests and I found it easy." Helen was most pleased with her results on both tests. After the first test, she enthused, ". . . all I can tell you is I GOT 79% ON MY MATH TEST!!! . . . I think I work much better in groups. I usually fail. I know I'm one of few people who are better in groups and I know we won't stay like this but I wish we could." Following the final test, she reported, "We don't have to go in groups anymore. I really enjoyed it though. I obviously did

better in groups though I actually passed my 2 tests!!! I am happy, my mom is happy and if I get 80% on my whole report card I get a new bike!!!!!''

Coping with Time Constraints

Throughout the project, time was a significant factor. Both unit and daily planning required many hours. The planning began with consideration of the prescribed curriculum objectives, and then a tentative timeline was established. Because many of the concepts and skills were at the introductory level, at least four weeks seemed necessary.

The Ginn *Journeys in Mathematics 7* textbook was used as a resource, but the focus was on personally-developed cooperative group activities that required concrete materials. Appropriate materials were selected to facilitate learning each objective. An inventory of on-hand manipulatives was taken, then a decision was made as to what other materials were to be borrowed or purchased. The daily activities were developed as the unit progressed.

Time had to be allowed for orienting the students to group work. As cooperative learning in mathematics was a new experience for most students, they needed to appreciate that the occasion was to be used for more than socializing. Routines had to be established. Rearranging the desks at the beginning and end of the class became progressively more efficient. Math classes were held four days per week. Each of the four students in a group was assigned responsibility for obtaining the folders, activity sheets and trays of materials on a particular day.

The cooperative learning process required considerable time and patience for both the students and ourselves. To encourage the students to work together, only one activity sheet was given to each group initially. However, many of the students were not sure how to share the sheet; some groups circulated it for each one to read separately and did the activities as individuals. Other groups attempted to read in unison but found it awkward to reposition themselves. After discussing the problem, Bryan and Marie compromised by giving each group two activity sheets. Even then, continual prompting was necessary to discourage them from working as separate pairs within a group. Frequent reminders were given to the students so that group members would monitor and help each other to understand and finish the activities.

Some groups worked more efficiently than others. For accountability, all students were expected to record their activities (for example, draw the result). Yet, some used too much time needlessly documenting (using pictures and writings) each step in detail. Pacing the activities was difficult for some students, as they were not used to making such decisions. As time went on, Bryan took a greater role in monitoring the amount of time they spent on each activity. The small-group approach with teacher as facilitator was a new teaching style for him, and the urge to go back to a more teacher-controlled situation was strong.

According to the curriculum, much of the fraction work in Grade 7 should be at the concrete level. Not only did the exploratory hands-on nature of the activities place demands on time but, because few students had experience with concrete materials, more time had to be allowed for them to become familiar with the manipulatives. Journal writing was often short-changed. As this was deemed an important aspect of the experience, special effort was required to ensure that enough time was allowed. One solution was to start the class with journal writing on occasion.

Coping with time constraints was an up-hill battle. Class time passed quickly; 40-minute classes were too short for an activity-based program. The teachers' and students' inexperience with cooperative learning and extensive use of concrete materials put extra demands on the time required. Further flexibility was required to accommodate school timetable changes and classes missed due to holidays and the teachers' convention.

Looking for Support

People feel stress when *someone else* (someone in authority) changes the boundaries, but the degree of stress is greater when the change is self-initiated, because the decision itself is questioned both internally and externally and there is self-doubt in addition to criticism by others. For this reason, ongoing suport is essential. Bryan and Marie continually looked for support from within, from each other and from the students. Unsolicited support from colleagues was relished.

Support from school administration is essential when a teacher departs from traditional methodology. Bryan's principal took an active interest, endorsing the project and visiting the classroom to observe the students as they worked in groups. Affirmative collegial support is also significant. Such encouragement came from a language arts teacher

who, on several occasions, looked in on the class and each time expressed her pleasure to Bryan at seeing group work and journal writing being done in math.

The value of motivation cannot be overestimated. Support from the students was manifested daily through their eagerness to enter class, set things up and use the materials enthusiastically. Even though they tended to react to the immediacy of a particular situation, their generally positive attitude was encouraging.

The availability and the practicality of using and storing the concrete materials was not a major problem: most of the students handled the materials reasonably and were accountable for their use. But, in view of the investment of money and teacher effort, Bryan found occasional lack of appreciation for the materials and subsequent misuse (at times from students in his other classes) frustrating.

High marks are often perceived as *concrete proof* of the success of a program. Because of this natural tendency to value test marks, Bryan and Marie were initially disappointed with the results of the first exam. Although the students' results were lower than hoped, they correlated with their marks from earlier in the year. Perhaps with a more traditional teaching and testing approach, the students may have been able to get more correct *answers* to routine questions, but Bryan and Marie doubt that the students would have had greater *understanding*.

Bryan admitted that even though long-term goals were critical and essential to him, a devil's advocate in the back of his mind kept telling him that he could get certain results faster with traditional methods. In fact, he pointed out that "good" students sometimes want the traditional approach because they have found it easy to be successful with it.

Bryan and Marie both considered the project a success. What they learned will guide their review and reteaching of the unit. Some of the benefits had immediate impact on Bryan's teaching style. Following this unit, he implemented cooperative learning in a Grade 9 unit on surface areas of prisms and cylinders, where he had previously used concrete materials. Not only has he shown more willingness to try innovative approaches with other classes but also he feels an increased responsibility to continue and broaden his teaching techniques. All teachers who experience similar anxiety should have confidence knowing that moving out of comfort zones is an indication of professional growth.