Creating Science and Math Programs based on Community Suggestions

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- The purpose of the research is to design a math and science program based on community suggestions.
- This year, five teachers and nine students were interviewed to find out what they liked and would like in math and science programs.
- The research is qualitative, involving semi-structured interviews and focus groups. There is no other way to get rich data.

- Students were selected for maximum variation academically, and for gender. Five boys and four girls were interviewed, ranging in academic performance. All students signed assent forms, and, if they were under 16, their parents signed consent forms.
- Teachers were selected based on subject areas taught. Some teachers taught whole grades, others just math or science.

- Teachers and students were interviewed for one hour each in December. Interviews were transcribed immediately onto a lap top computer. The transcriptions were returned for approval; interviewees were encouraged to make any changes they felt necessary - both for meaning and for protection. Anonymity cannot be guaranteed for teachers, but is possible for students.

- The transcripts were examined for themes, with the two sets - teacher and students - examined separately and by different researchers. Student themes tended to follow the questions, as students are more “compliant”. Teacher interviews were much more conversational and themes did not match the questions. Once both sets were themed, matches between them were sought.

Theme 1: Teacher-Student relationship is important for student success

- Three of the five teachers stated that academic motivation and attendance were related to teacher-student relationship. T1 said “Motivation? For some students it is on a personal level. They will study and learn and do things to please a teacher. Personal contact is important for them”.

Theme 1: Teacher comment

- T2: “And the second most important motivational factor is mutual respect between you and the students”. Extra-curricular coaching played a role here; with the extra-curricular relationship, T2 could then push students academically.

Theme 1: Student comments

- One student, in talking about the community's needs for math and science trained people mentioned "teachers. But we already have all good teachers."
- When asked about community role models for people with post-secondary training, two students only knew teachers as important role models.

Theme 2: Post-secondary advising and opportunities

- Students all had ideas of what careers they might like, where they would have to go to take programs for those careers, and what high school courses they required to get into those programs.
- One student said the school was interested in finding out what their dreams were, and helping them to realize their dreams.

Theme 2: Teachers

- Four of the teachers talked specifically about addressing the kinds of careers that students might enter with post-secondary math and science. Two teachers also mentioned the materials the guidance counselor sent around each day. The possibility of future careers was seen as one of the motivators for students working at their academics.

Theme 3: Intrinsic value of math and science

- Only one teacher mentioned the intrinsic value of science: “And on a human level, everyone is curious at some level. The interest is there in an engaging way and this motivates the students too. This is like any group of students. But in varying degrees and intensities.”

Theme 3: Students

- Five students talked about just enjoying the learning in science: learning about the periodic table, “enjoy biology because I learn a lot of things”, “chemistry and biology just interest me”, “discovering things”, “learning about animals and plants”, and “learning about things I never knew before”. One student had quit his fishing job because he was not learning anything.

Theme 4: Teachers see teaching as more than content

- “all the things that go along with being a responsible human being. To be able to build a strong and respectful community – the list of attributes and qualities that we need to be a good neighbour.” Another mentioned common sense, life skills and maturity.
- Two teachers mentioned students must learn to take academic risks - to try things that are difficult.

Theme 4: Challenge

- One teacher said: “I would like students willing to take risks and challenge themselves.”
- Three students liked math, and a different two students liked science, because of the challenge of the subject.

Theme 5: Science and math and out-of-school

- Three teachers talked about how science was important to the local students' ability to understand their environment.
- Teachers referred to math as being important for managing lives – money, specifically, but also for measuring for hands-on work.
- Four teachers noted that math was important for gaining access to post-secondary education.

Theme 5: Students and math

- Four students said that math was useful in their out-of-school lives because of money management. One student said math was useful in cooking. Three students were more global, saying such things as “It helps me solve my problems”, “It helps you with everything”, and “Everyone needs it”.

Theme 5: Students and science

- Three students could not think of any way in which science applied to their lives. Three students stated that knowing how the world works was valuable; one answered globally that science helped you to solve your problems. One student said science helped to understand the environment. One student said science helped with cooking, with acids and bases, with genetics, and tied in with math.

Theme 6: Outdoors and community

- Three teachers specifically mentioned their desire to use the outdoors and community more for their teaching. Three of the students concurred.
- Community resources such as elders were mentioned by the teachers, as well as possible work placements. Students mentioned work placements.

Theme 7: Role of the community

- All teachers saw themselves as either community members or as negotiating membership. One teacher mentioned the importance of developing a relationship of trust with students and the community, since teachers tend to be transient for northern communities.

Suggestions for changes

- Students wanted more experiments and hands-on science (7/9).
- Students wanted textbooks (3/9 for each subject), and, for math, more direct instruction (6/9).
- Teachers wanted more outdoor time (4/5) and so did students (3/9).
- One teacher wanted separate programs for different ability students.

Suggestions for changes

- One teacher wanted science fairs, and another suggested community math and science nights to invite the community. One student suggested evening learning-support.
- One teacher wanted a meaningful work placement program, and two students, similarly, requested opportunities to work at career-related jobs.

Conclusions

- Interview results indicate:
- The school is doing well already. Three of nine students picked math as their favourite subject. All students knew about post-secondary opportunities and careers. Five students enjoyed either math or science because the subject was challenging.

- Students enjoy hands-on science and experiments. Students reported the effectiveness of their math teacher with the hands-on work he was doing, but they requested more direct instruction. Students wanted textbooks.
- Students and teachers wanted more outdoor and community experiences.

- One student requested evening assistance for learning and two teachers suggested - not assistance - school-related math and science evenings, such as science fair or family math.
- Two students and one teacher suggested meaningful job placements.
- Next stage of the research: to help the teachers and the school to develop what they believe will support student learning of math and science!