

Making Connections

PROFESSIONAL JOURNAL OF THE MATH - SCIENCE SPECIAL INTEREST COUNCIL

Spring/Summer 2019

Volume 2, Issue 1

PRESIDENT'S REPORT

SPECIAL POINTS OF INTEREST:

- > **MSSIC holds meetings with NLESD to discuss teacher concerns about new assessment weightings**
- > **Partnership with TESIC results in successful STEMfestNL 2018 conference**
- > **MSSIC investigating possibility of holding STEMfestNL in other regions of NLESD**
- > **NLESD forms committees to support teachers with new assessment weightings and performance assessment practices**

INSIDE THIS ISSUE:

President's Report Continued	2
Blunden Seminar Report	3
Hydroponic Gardening at St. Peter's Academy	4
Canada Wide Science Fair Results	5
Tech up your underused microscopes	5
STEMfestNL 2018 Report	6
A Great Professional Learning Experience	8
Prime Minister's Award In Teaching Excellence	9
Contact us and Social Media Information	10

Wow! Where did this year go!? Seems like yesterday I was meeting my new students for the first time. Now summer, if it ever arrives, is just around the corner. When it does arrive, I hope you have a great and restful summer.

The Math-Science Special Interest Council (MSSIC) is your council. Please feel free at any time to contact us with questions, suggestions, or concerns. As your SIC we play two main roles. The first is to support and advocate for adequate Professional Learning opportunities. The second is to advocate for you when new

policies, curriculum, and procedures are planned or implemented.

This year we collaborated with the Technology Education Special Interest Council (TESIC) to bring you STEMfestNL 2018. Thank you to the many individual math and science teachers who stepped up to share their knowledge with their peers. We really could not offer an event like STEMfestNL without you. We are currently exploring the possibility of offering a similar event in Corner Brook in the next academic year; stay tuned for updates!

We have also been consulting with the staff at

the Newfoundland and Labrador English School District (NLESD) to raise concerns brought forward by math and science teachers. As you know, NLESD introduced new assessment weightings for junior and senior high school math and science courses that came into effect during the 2017-2018 academic year. During that academic year some of the membership of the Math Science Special Interest Council expressed concerns about these new assessment weightings and felt that they were having a detrimental impact on their teaching and on student success.

(see **President's**, page 2)

MEET THE MSSIC LEADERSHIP TEAM

Executive

President: Yvonne Dawe – Centre for Distance Learning and Innovation

Vice-President (intermediate/secondary): Nicole Ash – St. Kevin's High

Vice-President (primary/elementary): Nancy Ryan - St. Matthew's School

Treasurer: Karen Yetman – NLESD Program Specialist

Secretary: Jane Lloyd – Holy Trinity Elementary

Communications Officer: Tammy Manor – Holy Trinity Elementary

Board Members:

Jeremy Critch – Bishop White School, Port Rexton

Heidi Kavanagh – Holy Trinity High, Torbay

Terry Lavellee – Pasadena Elementary, Pasadena

Whitney Pye – St. Mary's All Grade, Mary's Harbour

Pat Wells - Holy Spirit High, Manuels, CBS

Board Associates

Saiqa Azam – MUN Faculty of Education

Craig White – Let's Talk Science

If you would like to play a more formal role with MSSIC, contact any member of the Leadership Team.

If you would like to become a member of MSSIC (no charge for NLTA members) contact any member of the Leadership Team.

PRESIDENT'S REPORT (CONTINUED FROM PAGE 1)

In particular, these teachers felt the new weighting system could have a negative impact on final grades. Specifically it was felt that these assessment weightings increased the difficulty for teachers to respond to the needs of students throughout the year. Teachers also found the new system made it difficult to incorporate science fairs and project-based learning activities using this weighting system.

MSSIC initiated a poll to gauge teachers' thoughts on the new assessment policy, if they agreed with the new weightings and if so, why or why not. The poll went to 95 members, 53 of whom responded. Of the 53 teachers who responded, only nine agreed with the new assessment policy (17%). The main reasons given were that teachers liked the application of time spent to the value in each unit and that it allows for consistency across schools. While many other teachers did acknowledge these aspects, the majority of respondents felt overall the disadvantages of the weighting system far outweigh the advantages.

In May of 2018, MSSIC communicated the results of the poll as well as a summary of teachers' issues with the new assessment weightings to the NLESD. This included some recommendations

for addressing these issues.

In December 2018, we met with district personnel to discuss these concerns. This meeting included Associate Director of Education Ed Walsh, Director of Educational Programs Georgina Lake and Program Specialists Glen Williams, Trevor Young, Sean O'Neill, Robert Swyer and Chris Byrne. The district personnel indicated that they did recognize some of the issues teachers had raised with the new assessment weightings and that they had formed working groups to address some of the concerns.

"... will provide examples of performance based assessments that could be integrated into most curriculum areas."

There are four working groups dedicated to the following topics: Gradebook, Performance Assessment, Student Engagement in the Assessment Process, and Formative Assessment. Each group is composed of 4-5 program specialists at the intermediate/secondary school level. Groups were formed based on topics selected by each program specialist.

Each group has met several times since the groups were formed in May 2018. As the groups are composed of individuals from across the district, meetings have taken place face to face and via Skype. The groups have met and will continue to meet as often as is required to ensure the goals of each working group are accomplished in a timely manner. The goal of each working group is to develop professional learning for teachers on the topics indicated. Once the professional learning has been developed and finalized it will be shared with all stakeholders.

A committee of program specialists is working to create a website that will address frequently asked questions about performance-based assessment. The committee will provide examples of performance based assessments that could be integrated into most curriculum areas. In addition, there will be guidelines and exemplars of scoring rubrics to aid with assessment and evaluation of performance based assessments.

NLESD has informed us that there is no plan to include any mandatory project in the course descriptor for any intermediate or secondary mathematics or science course.

(see **President's**, page 3)

BLUNDON SEMINAR 2019 REPORT

The Blundon Seminar is an annual (since 1982) three-day math camp for senior high school students from Newfoundland and Labrador who are interested in mathematics and demonstrate consistently good performance in mathematics competitions. Participation in the math camp is by invitation only based on the results of preceding Blundon, COMC, Euclid, Fermat, and Cayley contests. During the seminar, the students attend two one-hour talks given by professors from MUN. These talks are on various mathematical topics and applications of math in science and engineering. There are several problem solving sessions as well as other activities such as Mathletics and Papers Chase. Winners

of the various competitions are presented with prizes at the awards banquet. The winner of the Blundon Contest is presented with the Blundon Shield, to be displayed at the student's school, as well as an individual plaque. The Math-Science SIC sponsors the shield and plaque. President Yvonne Dawe attended the 38th annual seminar and banquet at East Hatcher Dining Hall on May 16. Ms. Dawe presented the plaque to this year's winner Benjamin Chislett, a level III student at Holy Heart High School. The Blundon Seminar is named for Professor W.J. Blundon who was the first head of the Department of Mathematics and Statistics at MUN, and an avid problem solver.



Benjamin Chislett, Level III student at Holy Heart High School receives his winning plaque from MSSIC President, Yvonne Dawe.

PRESIDENT'S REPORT (CONTINUED FROM PAGE 2)

However, the Newfoundland and Labrador English School District strongly encourages teachers to use a wide variety of assessment tools to allow students to demonstrate understanding of course outcomes and engage with

the curriculum.

MSSIC supports this recommendation. Should a teacher or school want to include a project in their yearly assessment plan, the NLESD Programs staff can support the teacher in implementing a project in

their assessment practice to ensure the evaluation remains congruent with the course descriptor.

MSSIC will continue to work with NLESD to ensure that the needs and concerns of our members are addressed. If

you have any questions related to the District assessment process, or any other issues related to the teaching of science or math, please do not hesitate to contact any member of the executive.

Again, all the best for a safe and restful summer!

Yvonne

HYDROPONIC GARDENING AT ST. PETER'S ACADEMY, WEST PORT



Harvest time at St. Peter's Academy, Westport.

"...I never thought I would see so many roots come from a plant..."



"Miss! We came to check on the garden over Christmas!"

I looked at them and was thinking to myself, 'Are you serious?!' Wow, this is really something. When you have students wanting to come to school over the holidays, you know it is a good project.

At St. Peter's Academy in Westport, NL we have started an indoor garden. However, it is not your typical soil-based planting system. Instead, we have taken it up a notch. We are using hydroponics to grow vegetables, fruits and herbs.

As a school, we strive to broaden the horizons of students and encourage them to develop a better understanding of sustainable growing. We wanted the students to have the experience of harvesting their own produce and learn how growing plants can have a significant positive impact on their lives.

On November 17, we started our Hydroponics project. One of our

teachers won a [Project Succseed](#) kit from [Conservation Corp NL](#). We began by growing leafy green lettuce in the kit and were amazed with how simple it is to set up the system. From there, we created 3 of our own makeshift hydroponic kits, as well as a hydroponic window farm. So far, we have grown lettuce, peppers, jalapeno and sweet bell - bok choy, swiss chard, tomatoes, and bean plants. In our window farm, we have started herbs such as basil, and dill.

The teachers are amazed with the overall participation and engagement of the students with this project. Mr. Jeff Quigley, principal, expressed that "The students have

shown tremendous interest in this project. Each morning they visit the garden to see the progress before going to homeroom. Students that usually do not participate in scheduled activities have taken leading roles in this project. This project has led to very teachable moments regarding science, environmental issues and future questions."

From the students' perspective, they enjoy being able to eat the food that they have grown and they are proud of their involvement in this project.

One student said, "I love going and checking on the garden because I am amazed with how much it has grown in such a short period of time. ...

(see [Hydroponics](#), page 7)



CANADA WIDE SCIENCE FAIR RESULTS



Science Team NL: Callum Derry, Juliana Koen-Alonso, Henley Mullins, Momin Anwar, Aaron Sarkar, Samantha Keats

Congratulations to the 6 students who proudly represented our province at the Canada Wide Science Fair in Fredericton, N.B. in May. Students were selected from 158 young scientists who competed at the 2019 Husky Energy Eastern

Newfoundland Science and Technology Fair in April. The team included Samantha Keats from Holy Spirit, Henley Mullins from St. Bonaventure's College, as well as Momin Anwar, Juliana Koen-Alonso, Callum Derry and Aaron Sarkar, all students from Holy Heart. The students spent a week at the University of New Brunswick along with chaperones, Ms. Stephanie Gallant and Mr. Jamie Parsons.

The national fair brings together approximately 500 junior and senior high school

students from all provinces and territories.

Juliana, Henley and Momin each won a bronze medal while Aaron was invited to the STEM Entrepreneurship Bootcamp this summer, sponsored by York University and BEST (Bergeron Entrepreneurs in Science and Technology). In addition, all medal winners were offered entrance scholarships to a number of Canadian Universities including Western University (London, Ontario) and the University of Ottawa.

ARE YOUR MICROSCOPES SAD AND NEGLECTED?

If you said "yes" use mobile tech to bring them back to life!

Most schools have microscopes that have a 400 X magnification. This makes them underpowered, a struggle to operate, and prevents students from extending senses. Many schools have a special camera for the microscope that is used to put images on a monitor. But, setting the camera up is awkward, it takes time and lab space, and tends to focus on the subject, not the students (more on this later). However, if you want to help each student extend their senses and understand what they are viewing, mobile devices with their hi-res built in cameras are the answer.

Many students arrive in class with a phone and

many schools have tablets with cameras (for CDLI you are on line and that allows for sharing). I have used both devices to help students understand mitosis, chromosomes, plant reproduction, and pond water samples (for mitosis see Figures 1A & 1B). The trick is teaching students how to take microscope pictures or videos with their device.

This one-minute video (<https://www.youtube.com/watch?v=MPYDDJ-4Ck8>) demonstrates the technique used to take pictures. The key is keeping the dot of light from the ocular lens in the middle of the camera, while steadying the device by touching the microscope – practice makes perfect.

The greatest benefit of this trick is not the increase in magnification

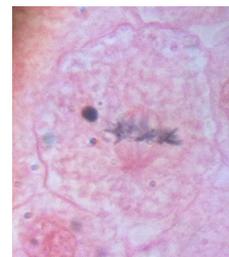
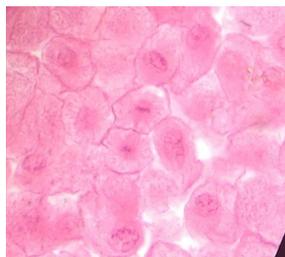


Figure 1A (left) – 800 X image of whitefish blastula cells in different stages of the cell cycle. 1B. (right) An edited picture with added zoom to demonstrate artefacts (dots), chromosomes, and microtubules of a whitefish blastula cell in metaphase.

(which is sweet), it is sharing the image with the student to point out the structures and explain what they are visualizing. This sharing is a great teaching moment where you teach a student, not a subject (do you see the difference?). See the images 2 A and 2 B below.

(see **Microscope**, page 10)



Figure 2A (left). A student sharing an image with a teacher. Figure 2B (right). Students reviewing images with each other.

STEMFESTNL 2018 A RESOUNDING SUCCESS!

STEMfestNL 2018**By the numbers:**

- 34 presenters with a total of 36 sessions (offered over 4 time slots)
- 13 volunteers from MUN
- Over 130 participants, including approximately 20 pre-service teachers from MUN's Faculty of Education
- Participants from all over the Province, including Rigolet and Churchill Falls!
- A wide variety of prizes & swag, including 10 Chromebooks (1 early bird prize, 1 for presenters, and 8 for participants)
- Several hundred hours of planning... thanks committee members!

It has been said that the measure of success is not just how many hands are working, but how well they are working together (Ron Kaufman). As a participant, presenter, and one of the organizers of STEMfestNL 2018, I couldn't agree more!

On December 3rd, approximately 130 participants arrived at Memorial University's Education building. They were eager to engage with other like-minded professionals, and to listen to well-respected keynote speaker, Dr. Karen Goodnough, in one of the biggest STEM (Science, Technology, Engineering, Math) conferences held in our province in recent years. The chance to win 1 of 10 Chromebooks was just an additional perk!!

Early in 2018, the Math-Science and Technology Education Special Interest Councils (MSSIC & TESIC) began planning a large-scale Professional Learning event. Teachers around the province were clamouring for help getting started with coding and other STEM-

related initiatives. The interest was especially high after the April announcement of a partnership between the Provincial Government and Brilliant Labs and the host of other groups receiving CANCODE funding from the federal government. Together, members of both NLTA Special Interest Councils worked diligently to organize STEMfestNL 2018, a full-day Professional Learning conference, geared toward educators from Kindergarten to Grade 12.

Over 30 presenters, along with 17 pre-service teacher volunteers, came forward to help share in the excitement of STEM education, offering sessions on a diverse range of topics. Each participant was able to choose up to four sessions, best suited to their individual needs and teaching situation. This truly encompassed the very definition of differentiation. From coding sessions (e.g., Hour of Code, Microbits) to Digital Assessment, Maker

Space (including 3D printing) to Video Production, Numeracy Blocks to "Life on Mars", there was literally something for everyone! In fact, many participants commented that there was so much choice, the event could easily have been held over 2 days.

Throughout the day, members of the organizing committee anxiously waited for the proverbial shoe to drop. With such a large-scale event, it was assumed that something would go wrong. But as the day progressed, it became increasingly clear just how successful the event was turning out to be. Sessions went smoothly. The nutrition break was delicious. And the technology worked!

Feedback received after the event was overwhelmingly positive. There were requests for STEMfestNL to become an annual event, perhaps being held in various regions of the province; a possibility that MSSIC and TESIC are exploring.

(see **STEMfestNL**, page 7)



STEMfestNL

HYDROPONICS (CONTINUED FROM PAGE 4)

“... It has grown a lot, and it is so cool - I never thought I would see so many roots come from a plant.” Another student expressed that “it is good to be growing your own ‘stuff’ because then we can get fresh vegetables when we want. My favorite part about it is eating the fresh vegetables.”

This project has hit on many science curriculum outcomes from across grade levels. It teaches students about:

- the life cycle of plants - flowering and non-flowering,
- pH - acids and bases, solutions, mixtures,
- photosynthesis,
- chemical reactions,
- developing lab skills
- scientific methods and developing hypotheses

Our hydroponic garden has become a wonderful means of delivering inquiry hands-on learning opportunities for our students. Through their involvement in this project, students have also developed improved questioning and analytical skills. It also nurtures their natural curiosity and helps them develop an understanding of sustainability. In her article, *“Gardening for Kids: 7 Reasons Planting Seeds Enriches Their Lives”*, Brianna Flavin states that, in addition to the improving STEM and analytical abilities, gardening promotes a “well-rounded development” of children. She outlines some of the research that indicate the benefits include building a sense of confidence,

encouraging better eating habits, relieving stress, improving focus and memory, as well as improving mood and psychological well-being. We have observed many of these benefits in our own students.

To learn more about our project, check out our blog @ <http://stpetersacademy.blogspot.ca/> where we periodically update our progress. If you would like to start your own school hydroponics garden feel free to contact our school - we will be happy to help you get started!

Alicia Wells teaches grade 7 and 9 science at St. Peter’s Academy, Westport. Follow the school’s hydroponics project at <http://stpetersacademy.blogspot.ca/>.



Students are involved in all stages of this project.

“In addition to improving STEM skills and analytical abilities, gardening promotes a well-rounded development of children.”

STEMFESTNL (CONTINUED FROM PAGE 6)

Overall, STEMfestNL 2018 was a resounding success, thanks to the professionalism and enthusiasm demonstrated by attendees, volunteers, presenters, and organizers alike.

If it is true that success can be measured by how well people work

together, then STEMfestNL 2018 ranks as the most successful conference I have experienced!

Thanks to Tammy Manor, Holy Trinity Elementary and MSSIC Communications officer, for providing this first-person account of our conference.



STEMfestNL Committee—Left to Right: Melissa Lee, Saiqa Azam, Karen Yetman, Tammy Manor, Michael Walter, Janine Foley, Matthew Thomey, Jarratt Rose. Front: Megan Roome, Nancy Ryan, Yvonne Dawe

A GREAT PROFESSIONAL LEARNING EXPERIENCE

The Science Teachers' Association of Ontario (STAO) hosted their annual conference in Toronto, November 2018. This is a professional learning opportunity that promotes innovation, inclusion and excellence in science education. This year, two of our executive members, president Yvonne Dawe and secretary Nancy Ryan attended. The conference, held from November 8 to 10, brought together approximately 2000 educators, from all grade levels. In addition to keynote speakers, there were a large number of sessions available each day in a variety of disciplines.

The following is a summary of our most meaningful experiences.

Yvonne: I am a full time e-teacher with CDLI and I teach both levels of Chemistry. I was impressed with the number of sessions dealing with chemistry and that was one of the main reasons I was interested in attending this conference.

The Department of Chemistry at University of Waterloo gave one of the most interesting, and potentially most useful, session I attended. They are building an Online Chemistry resource and have developed a professional development program for secondary school chemistry teachers who are interested in participating. The PD program provides teachers with the instruction, resources and support to work collaboratively with experienced first-year instructors in the Department of Chemistry in order to create interactive, online chemistry lessons for students. The resource is hosted and freely available on Waterloo's Open Science site. <https://open.science.uwaterloo.ca>

The lessons are designed according to the principles outlined by the User Experience Design for Learning (UXDL). The UXDL framework, represented below as a honeycomb, places learners at the centre of the design

process. The goal is to make sure the content is useful, desirable, accessible, credible, and intuitive.

Each online lesson begins with student centered learning outcomes. Following each outcome is a series of questions that allows the learner to self-assess the required prerequisite knowledge. A variety of text, images and animations are used to present the material to the learner. This is followed by a summary of the key points and with assessment questions at the end. The questions are generated dynamically and are graded instantly. This immediate feedback allows students to self-assess and learn from their mistakes.

This online resource could be a powerful interactive tool to assist students in mastering concepts they find challenging or just as a means for review in preparation for an assessment.

(see **Great PD**, page 9)



The User Experience Design for Learning (UXDL) framework.

GREAT PD (CONTINUED FROM PAGE 8)

NANCY: While I attended many great sessions, it was the two plenary talks that I found most enlightening.

Truth constantly moves.

The first plenary talk was by Dr. Niigaan Sinclair (Niigaan.Sinclair@umanitoba.ca) titled “Indigenous Creation as Science”. It was interesting to learn how science is a tool; a cultural extension all human groups used in coming to know the natural world. Specifically, indigenous science has influenced our world in the areas of food and medicine, technology, ecology as well as astronomy and physics. The First Nations education philosophy of holistic learning was also discussed and that it promotes an inquiry based learning pedagogy. “Truth constantly moves” stated Dr. Sin-

clair. “One will always keep learning about the world and one will never know it all! Mysteries are OK! Mysteries are interesting!” he exclaimed. How true. This is why inquiry based science education is key to our students’ learning from Kindergarten through to graduation. This plenary talk is available at

www.youtube.com/watch?v=4JigLf1jrl4&feature=youtu.be&t=93

Science needs to be shared in peace.

Physicist Dr. Neil Turok (nturok@perimeterinstitute.ca) dedicated his talk on day two “to teachers everywhere”. He gave an amazing history of the development of mathematics, science and cosmology. One interesting statement Dr. Turok shared was from Edward Condon, the developer of the first modern

computer. Condon believed that “Science is fun. Science is important. Science needs to be shared in peace.” This is a powerful statement for science educators. This is a powerful statement for our future. Dr. Turok’s message for educators is that all children must engage in science that promotes wonder and optimism and the sharing of knowledge. Science is powerful. Science promotes collaboration, breaks barriers and improves the world. This plenary talk is available at www.youtube.com/watch?v=UEMUabmibRk&feature=youtu.be&t=155

STAO2018 certainly lived up to its mission of “encouraging excellence in science education”. I recommend this professional learning opportunity to any science educator.

“...indigenous science has influenced our world in the areas of food and medicine, technology, ecology as well as astronomy and physics.”

PRIME MINISTER’S AWARD IN TEACHING EXCELLENCE—STEM WINNER

MSSIC would like to congratulate our VP (primary/elementary), Nancy Ryan, who is the only Newfoundland and Labrador recipient of the 2019 Prime Minister’s Award In Teaching Excellence - STEM. Nancy is a Grade 3 teacher at St. Matthew’s

School. In addition to her leadership role on MSSIC, Nancy plays a huge leadership role at St. Matthew’s. Some of her activities are: establishment of the school’s community garden, composting initiatives, chess club lead, and Code Club for grades 4 and 5.

Inside the classroom, Nancy teaches using an inquiry based process, shares her passion for literature, and leads by example that learning is a lifelong journey filled with joy! Congratulations on a well deserved award!

Read more about Nancy and her award at <https://www.cbc.ca/news/canada/newfoundland-labrador/nancy-ryan-national-teaching-award-1.5157290> and

<https://www.ic.gc.ca/eic/site/pmate-ppmee.nsf/eng/wz02372.html>

The Math-Science Special Interest Council of NLTA is a professional learning community dedicated to fostering growth and development of its membership in the areas of math and science teaching and learning.

Contact Us

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MICROSCOPE (CONTINUED FROM PAGE 5)

Mitosis is key to understanding meiosis, sexual reproduction, genetics and evolution. No pressure! I start the lesson on mitosis with a summary of stages and a short movie; the Amoeba Sisters are cool but their videos are long so I recommend skipping to 5:26 of this video (<https://www.youtube.com/watch?v=f-lDpgEfAHI>). I follow the video with a student Play-Doh activity (mmmm...Play-Doh; the smell brings fond memories of childhood). The serious teaching goal of the activity is to

have students model chromosomes and then use these models for the stages of mitosis (all you need is Play-Doh and thread, see Figures 3A & 3B). More importantly the students get the idea that these are 3-D structures inside cells. During the activity students are encouraged to take photos (using tablets or their cameras – Figures 3A & 3B are student photos). With Google we built docs as an online lab to show pictures of the stages of mitosis and label the parts of the chromosomes.

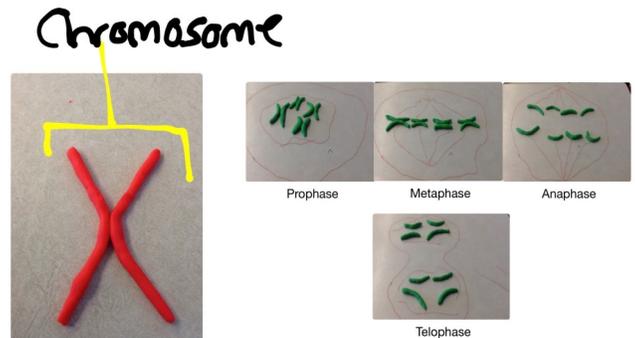
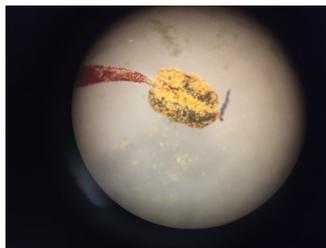


Figure 3A (left). Play-doh chromosome made by students. Figure 3B (right). Stages of mitosis constructed during group work by 3 or 4 students.

The Play-Doh leads to the lab, lab report, and quiz using Plickers (for a two-minute tutorial try this link - <https://www.youtube.com/watch?v=bejiz2HzUz8>). For learning the stages and anatomy of mitosis, students rated the lecture as last place with the video as first place. However, to reach all students we need to mix it up and differentiate instruction; the video alone is not enough.



You can also apply the use of microscope imaging techniques to other subjects such as Grades 8 & 9 Science, Science 1206, Biology 2201 and 3201, for field trips, labs, and activities (Such as the plant structures in Figures 4A (left), 4B (centre), & 4C (right)).

Science is a sensory experience and I encourage you to help students extend their senses with their phones. Sensing will lead to questions, sharing, and discreet teaching moments with you. This brief time, focused on student's questions, will help them address their personal needs and is a big part of making a strong memory. This is, after all, a teacher's business: making memories!

Pat Wells is Science Department Head at Holy Spirit High School.