Making Connections

PROFESSIONAL JOURNAL OF THE MATH-SCIENCE SPECIAL INTEREST COUNCIL

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SPECIAL POINTS OF INTEREST:

- **MSSIC supports the expansion of science fairs in provincial schools via a virtual fairs approach**
- **MSSIC conducts successful Professional Learning session for NLESD Western Region Teachers**
- **MSSIC offers virtual learning opportunity using webinar approach**

INSIDE THIS ISSUE:

PRESIDENT'S REPORT

What a year this has been! The events of this year with the Covid-19 situation were indeed unprecedented. However, teachers, being the professionals that they are, stepped up to deliver curriculum using new platforms. Kudos to all teachers who adapted to the challenges of on-line learning. You have certainly earned your summer break!

The Math-Science Special Interest Council (MSSIC) is your council. Please feel free at anytime to contact us with questions, suggestions, or concerns. As your SIC we play two main roles. The first it 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.

One important initiative this year was to facilitate greater participation in science fairs across the province. To this end, MSSIC board members, who are also members of the Eastern Newfoundland Science Fairs Council, prepared a "how to guide" in Google Docs. This was shared with all Grade 7-12 science teachers in the province (see link, start with SC FAIR PART 1). The guide gave teachers a template and tips for their students to use in carrying out different parts of a science fair project. These documents also included a template for the display/presentation aspect of a virtual fair. While a physical fair has been held in the eastern region of the province since the 1980s, there is at present no fair in the three other regions in the province (Central, Western, and Labrador). Thus, we planned a virtual fair for students from these regions for March.

One of the aims of this fair was to select students with the best projects to join Science Team NL in representing

MEET THE MSSIC LEADERSHIP TEAM

Executive:

President: Yvonne Dawe – Centre for Distance Learning and Innovation

Vice-President (intermediate/secondary): Nicole Ash – Gonzaga High School, St. John's

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

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Heidi Kavanagh – Holy Trinity High, Torbay

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

Annette Warren—Sprucewood Academy, Grand Falls-Windsor

Board Associates

Saiqa Azam – MUN Faculty of Education

Craig White – Let's Talk Science

Michelle Hamilton and Brittany Swain— Secondary Science, Preservice Education Program, Memorial University.

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)

Canada Wide Science Fair (CWSF) in Edmonton in May. Fundraising efforts garnered enough donations to sponsor 3 students from outside of Eastern. When schools closed in March, the virtual fair was cancelled. Later, the decision was made to proceed if the students were willing. Students had already put a lot of work into their science projects so we wanted to give them the opportunity to present their research. The fair was held on Saturday, May 9 with 5 participants. While small, the success of the first ever virtual fair in the province bodes well for the future. Following that success, a second virtual fair was held in lieu of the annual Husky Energy Eastern Newfoundland Science and Technology Fair. This too went very well and involved 20 projects (23 students) from 8 schools in Eastern NL. (More on this in the article below, page 6).

> **"Students had already put a lot of work into their science projects, so we wanted to give them the opportunity to present their research."**

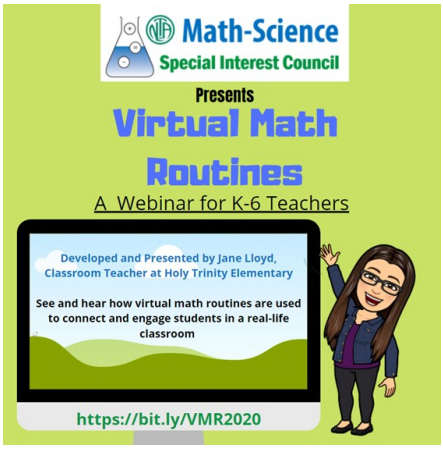
MSSIC has held several successful STEMFestNL events since we were founded. Building on these successes, we held a one-day event in Corner Brook in late February. Special thanks to the teachers who attended as well as to our board members who stepped up to facilitate sessions. (See article on page 9). We plan to continue to facilitate professional learning opportunities, albeit they will of course be virtual in nature, at least for the foreseeable future. To that end, board member Jane Lloyd prepared a Webinar for K-6 teachers on Virtual Math routines (see article page 2).

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

VIRTUAL MATH ROUTINES - WEBINAR

Since the onset of at home learning many teachers, students and families have had a steep learning curve as they entered the online learning environment. This is especially true when it comes to figuring out which digital apps, extensions, websites and tools are best to use. To help teachers with their learning curve, the MSSIC offered a webinar to K-6 teachers. The focus was on how to implement virtual math routines into home learning (with a lot of application to in school learning too). Feedback and overall attendance shows that this webinar was a huge success.

Jane Lloyd, a grade 3 classroom teacher at Holy Trinity Elementary in Torbay created and delivered this 30 minute webinar. This webinar was packed with real life examples and strategies to ensure students are practicing math with engaging material and tools.



Math routines are important ways to promote the seven math processes, fuel student motivation and engagement, and inform teachers of next steps for instruction and assessment.

In just one week, the webinar had over 450 views and was shared numerous times on both Twitter and Facebook.

Follow the life of Jane's classroom on Twitter @MrsLloydHTE

To view the webinar click here

TEACHING ONLINE—NEW LEARNING & OPPORTUNITIES

As a new teacher in my fifth year teaching, I always have new lab courses to digest each fall. As a result, I arrogantly thought in mid-March teaching online would be easy and imagined the break from setting up labs would make online learning a breeze. Instead, I found out quickly in March and April this year, that the online process is incredibly complex. I am by no means an expert in online teaching but with the help of some amazing colleagues from Holy Trinity High in Torbay, NL, the online experience is improving daily even amongst a global pandemic. Here are some things I've experienced and most likely you have too:

1. Online teaching is overwhelming

I was completely opposed to using Google Meet with students when it was first introduced to me in March. I admittedly could not imagine them for privacy concerns. So I asked a colleague if I could sit in on a Google Meet with her students. Once I saw how she dealt with the online format, I felt comfortable scheduling a Google Meet with my students the next day. I'm so very glad I did! Hearing from my students was a highlight of my week and continues to be so 8 weeks later. There are a lot of parts of online learning that are difficult. I think it's normal to need some help from colleagues during this transition; don't be afraid to ask.

2. Connecting with students is the best part of our jobs

I didn't know how much connecting with students meant to me until we were forced to abruptly stop on March 16th. Now when I see my students working at a grocery store, I embarrass them with my enthusiasm to say hi (sorry kiddos!).

To continue the relationship building, I have sent out Google Forms asking students how they're doing (here is the form I sent home in March). Students replied letting me know they were loving the time off, or hating the time off, and everything in between. It was great to get an idea of how they're doing. I replied to them all by email (had 78 replies out of my 176 students). That was a big task but one I thoroughly enjoyed. Since April, I have had weekly assignments in my classes. To continue connecting with the students, I write in the "Private Comment" section of their assignments. Oftentimes it's formative feedback but occasionally I may ask how they're doing. Having those private conversations with students is a plus for me and I hope they enjoy it too.

3. Learn from your colleagues

The administrators at my school were very forward-thinking with respect to the online learning experience. They sought out individuals on staff to do PL, using Google Meet, on the different tools they were finding useful. I attended PL on Google Forms, Pear Deck, Jamboard, and EdPuzzle. Learning from my colleagues, who are also classroom teachers, was some of the best PL I have ever received. I would suggest every school offer PL using their experts (aka teachers on staff) through Google Meet. It is a very low-stress way to learn and allows teachers to explore the abundance of educational apps available.

(see **Teaching**, page 4)

PRESIDENT'S REPORT (CONTINUED FROM PAGE 2)

We are working on more such webinars for teachers in preparation for the new academic year. If there is a topic you would like to see offered, or if you would like to share something with you colleagues, please contact any member of the executive. We have also provided a number of links and a brief description below for a variety of online resources that teachers may find useful.

As I said at the outset of this letter, it has been an unprecedented year. We all have experienced successes and challenges. We probably learned more about on-line meeting tools than we ever knew existed! While no one knows what our "new normal" will look like, rest assured that your MSSIC will be here to learn and work with you.

Please enjoy your summer break. We all look forward to seeing you in the new school year.

Sincerely,

Yvonne

TEACHING ONLINE (CONTINUED FROM PAGE3)

More important than ever, don't reinvent the wheel. If you have colleagues teaching the same courses as you, take/borrow/steal resources and don't forget to share in return (please take whatever resources you may need from my website). In my opinion, having to convert all of our resources into new formats is the most time-consuming part of online teaching. So if you have a colleague, who has completed a resource, take it and run (but make sure to thank them first!). Collaboration is key!

4. Mental health awareness is more important than ever

The thought of being stuck inside your home for the foreseeable future is troubling to most people. Being supportive and understanding of your colleagues is crucial at this time. While we are all worried about the mental wellbeing of our students, it's equally as important to worry about the wellbeing of our colleagues. Check-in on them; it means more than you'll ever know.

Two of my colleagues created an optional Social and Emotional PL session for teachers during the pandemic and ran it three times. They did a phenomenal job making it a low stress, non-judgemental space. Here we were able to share our triumphs and challenges during our online teaching experience as well as our "new normal" for our personal lives. They also pulled in a third colleague who is a yoga teacher to do a ten-minute meditation at the beginning of the session. This PL was a highlight of my week! I found it so empowering to know that while our struggles are unique, everyone is facing new uncertainties and we are not alone. I would suggest you take this on as a staff at your school as it's an amazing team building opportunity.

5.You won't reach all students

Something that I've struggled with throughout the whole experience is the low uptake from students with online learning. After many conversations with my wonderful colleagues, I've come to realize this isn't a reflection of me as a teacher but instead reflects what these students are facing at home. As a Grade 9-12 teacher, many of my students are now taking care of younger siblings, have extra responsibilities around their homes, or have picked up extra hours being frontline workers. For younger students, I can only imagine how difficult this experience has been on working parents that are now tasked with entertaining and educating their children on top of their work responsibilities. Motivating children to attend Google Meets and complete assignments while simultaneously engaged in professional responsibilities is not a top priority for many families and that is completely understandable.

One thing I have found with online learning is the importance of changing things up. Some students love completing Google Forms, some love completing traditional worksheets and so on. When I've tried out new things over the past 8 weeks, I have always had a new student join in that I hadn't seen previously, which I find exciting. I would suggest assigning a Kahoot or EdPuzzle to switch it up for your older students. They seem to enjoy them and find them educational.

While in discussions with educators from all over the province I have come to realize that there is no perfect solution to online teaching, just like there isn't a "one size fits all" solution for in-class instruction. We need to accept that we cannot replicate the classroom experience digitally. I spent a lot of my time in Google Meets during the last week of instruction asking for student feedback on their experience with online learning. What I've heard is a lot of contradicting statements between students. Some love learning "live" on Google Meets, others enjoy pre-made videos that can be watched (and re-watched!) on their own time. I have decided that the best solution is the one that works for the teacher. Just as there isn't a classroom management technique that works for every classroom, you have to choose what works for you in your circumstances and circumstances change all the time. Variety will satisfy the teacher, but will also reach and motivate students with differing learning abilities. It's a win-win!

All in all, I hope the last couple of months were an exciting (albeit overwhelming!) learning experience for you. As we have compassion for our students, make sure you exercise the same type of compassion towards yourself. We are all in this together.

Heidi Kavanagh teaches at Holy Trinity High School

REFRAMING FOR OUR NEW REALITY

Our spirits strong; our strength not deadened,
we somehow survived a snowmageddon.
But twenty-twenty sneered crying, “Here, you! Hold my beer!”
And now, locked in with this pandemic,
the issues are much more than academic.
One thing for certain is the challenge that is our next school year.

The change will happen across many layers
so please don’t listen to the sad nay-sayers
who think remote teaching is a wasted effort, a mere fool’s game.
For our young ones are far from feral
and their education won’t be in peril
so long as we are willing to let our world-views be reframed.

Yes, once we viewed a learning space
as a room where we gathered, face to face;
a *thing*; a structure that owed its existence to it’s physicality.
But in this time of social distance
we must create a new existence.
The virtual ties we build together will form our new reality.

New ways to be present; you’ve heard of Zoom?
Maybe Collaborate, Webex, even Messenger Rooms?
No doubt by now you’ve taken one or more out on a trial,
all decked off in your new headset.
But a session or two left you knackered, I bet.
Seriously: getting used to this mode is going to take a while.

“Why is online so tiring?” you may have mused.
Well, we we’ve had whole lives to become used
to our normal senses. Now our attention is also slapped
with stattaco audio, and a video soup,
text chats, both individual and group;
these are add-ons, and to them our brains will need time to adapt.

So as you set out to make plans for the fall
it’s important to keep both your eyes on the ball.
Achievement trumps all but what matters most is what *students do*.
So don’t lecture and “cover stuff” at great length.
We’re not entertainers; our greatest strength
comes from creating the success path and steering them all through.

Rather than preventing all distractions
focus, rather, on interactions.
Employ your breakout rooms and maybe bring in virtual guests.
Use Collaborate, Meet, Webex or Zoom
in tandem with your Google classroom.
And find other ways of assessing than reliance on pen and paper tests.

Yes, breakout rooms may leave you vexed.
Why they’re so cumbersome, leaves us all perplexed.
Still, with practice it doesn’t have to feel all that contrived.
They accomplish more than idle jaw.
Organize; double up for a jig saw!
And with practice your small groups will surely come alive.

When the whole class contributes to the same Google Doc
and then views it as one, it’s a gallery walk!
Or, given one minute and each student with their own blank page,
encouraged by you to contribute their thoughts,
each attending as well to their own unique spots.
Your students’ minute paper will not fail to amaze and to engage.

With Xmind, FreeMind or maybe MindMup
groups in breakout rooms, can do a concept map up.
Or turn them all loose on a Doc to create a cool Graffiti wall.
And also, since you can share your desktop,
the whiteboard with software then you can swap:
Lab interfacing, Desmos, Geogebra, whatever: your class can have it all.

And, as for the chaos. It’s not a rat race.
Al hands will settle in once routines are in place.
Set rules around cameras and use a hands-up as a talking piece.
Don’t hog the mike, encourage debate.
After questions are asked allow a sufficient wait.
Then your class participation is guaranteed to only increase.

And always remember, if you’re patient and kind,
your students’ needs and yours will remain quite aligned.
And if on one slow, frustrating day, for sanity you are reaching,
remember it’s straightforward; the order’s not tall
so long as one truth is remembered and kept above all:
It’s not science, or math, but students that you are teaching.

Maurice Barry has been a practicing educator since 1983. He is currently the coordinator of MUN’s Teaching and Learning Commons.

Nicholas Flowers, Amos Comenius Memorial School, Gold medalist & Best of Fair

Amy Gillard, St. Stephen's All Grade, Gold Medalist

Taylor Shiwak, Northern Lights Academy, Silver Medalist

NL VIRTUAL SCIENCE AND TECHNOLOGY FAIR: A FIRST FOR THE PROVINCE

Science history was made in this province on Saturday, May 9, 2020 when 5 students competed in the very first NL Virtual Science and Technology Fair.

Plans for this fair began this past fall, spearheaded by a subcommittee of the Eastern Newfoundland Science Fairs Council (ENSFC). The volunteer members of the council organize the Husky Energy Eastern Newfoundland Science and Technology Fair. This fair, which takes place in St. John's each spring, usually involves more than 100 students from grades 7 to 12 from schools on the Avalon Peninsula. The highlight of the Eastern fair is the selection of students to attend the Canada Wide Science Fair (CWSF). This national fair was scheduled for a week in May in Edmonton, Alberta. The ENSFC covers all costs to send 6 students and 2 chaperones to this event. The plan for the NL Virtual Fair was to offer an opportunity for students in the other 3 regions (Central, Western and Labrador) to compete for "medals", prizes and 3 additional spots on Science Team NL at the 2020 CWSF.

Unfortunately, due to the COVID-19 situation the CWSF was cancelled. This was followed by the cancellation of regional fairs across Canada. However, given the obvious lack of physical contact required for a virtual fair, organizers Yvonne Dawe, Heidi Kavanagh and Patrick Wells, all local high school science teachers with the NLESD (and MSSIC board members), decided to continue with their plans if students were still interested in participating. The fair competitors included 4 students from Labrador and one from Rencontre East, on the south coast of the island, representing both school districts in our province: the Newfoundland and Labrador English School District and the conseil scolaire francophone provincial de Terre-Neuve et Labrador. The fair took place in Google Meets where students presented their projects to 4 local judges, 2 of whom were bilingual, and then answered judges' questions. Each student was allotted 30 minutes, after which points were tallied and "medal" certificates and other prizes were awarded.

Nicholas Flowers, a grade 12 student at Amos Comenius Memorial School in Hopedale won gold and was chosen Best of Fair as he had the highest overall score. Second place and also winning gold was Amy Gillard, a grade 10 student from St. Stephen's All Grade in Rencontre East. Third place and a silver medal went to Taylor Shiwak, a grade 10 student from Northern Lights Academy in Rigolet. The other 2 participants, both grade 7 students from Labrador won silver. Hannah Snider attends École Boréale in Happy Valley-Goose Bay while Meaghan Lee is a student at Centre éducative l'ENVOL in Labrador City.

Had the CWSF not been cancelled, Nicholas, Amy and Taylor would have been chosen to be part of Science Team NL. Notably, participation at the national level by students from Labrador would have been another first for our province. All 5 projects from the NL virtual fair can be viewed at https://enstf.ca/virtual-fair/.

(see **Virtual Fair**, page 7)

VIRTUAL FAIR (CONTINUED)

Following the success of the first NL Virtual Science and Technology Fair for students outside of Eastern NL a second virtual fair took place in the province on May 13, 2020. A total of 23 students (20 projects) competed in the Eastern NL Virtual Fair. This virtual version was in lieu of the 2020 Husky Energy Eastern Newfoundland Science and Technology Fair, previously scheduled for late April 2020.

The students presented their projects to judges in Google Meets, 3 judges per group. There were 4 groups in total divided by grade levels: 3 groups were judged in English and one group judged in French. Each student or student team (of 2) was allotted 30 minutes, after which points were tallied and "medal" certificates and other prizes were awarded.

John Scott Pearce, a grade 12 student at Holy Heart High School in St. John's won gold and was chosen Best of Fair as he had the highest overall score. Second place and also winning gold was Emily Meade, a grade 12 student also from Holy Heart. Third place and a gold medal went to Linnaea Bird, a grade 10 student from Holy Trinity High in Torbay. In addition 2 more gold, as well as 7 silver, 6 bronze and 2 Honourable mentions were awarded to participants. While the number of projects was lower than the usual 100 or more at the annual physical fair, the quality of the students' work was not. All student projects from the Eastern NL fair can be viewed at: https://enstf.ca/awards-and-winners/

For both NL virtual fairs, in addition to the medal certificates, monetary prizes were also awarded including $500, $300 and $200 for first, second and third, respectively.

In lieu of the Canada Wide Science Fair, Youth Science Canada, hosted an Online STEM Fair for any student in the country in grades 7 to 12: https://makeprojects.com/ysc. Students did not have to compete in a regional fair beforehand. There were over 600 entrants from across Canada. Of these, 14 entries were from NL: these included 2 of the 5 from outside eastern and 12 from eastern, half of whom had competed in the Eastern NL virtual fair. Four of those 14 projects were recognized as outstanding projects for the region: Nicholas Flowers from Amos Comenius Memorial in Hopedale for his project on determining the fuel value of seal oil; Peter Noel and Claire Bates, both grade 12 students from Holy Spirit High in CBS who studied the effect of gender on colour perception; Paule Mendez, a grade 11 exchange student from Spain, attending Holy Heart High in St. John's who studied the effect of exocyst70A3 gene in plant root systems to help fight climate change and MacDonald Drive Junior High student Muhammad Ibrahim Anwar, for his project using electrocoagulation to remove mercury from water. Muhammad is in grade 7 while all other winners are senior high students. In addition, Peter and Claire won a national YSC award.

All students who participated in these science fair alternatives to physical fairs have shown a high level of initiative, creativity and perseverance, all important qualities of any great scientist.

(See **Virtual Fair**, page 8)

John Scott Pearce, Holy Heart High School, Gold Medalist and Best of Fair

Emily Meade, Holy Heart High School, Gold medalist

Linnaea Bird, Holy Trinity High, Gold Medalist

PROJECTS RECOGNIZED AS OUSTANDING IN THE REGION

Nicholas Flowers, Amos Comenius Memorial, studied the fuel value of seal oil

Paule Mendez, Holy Heart High School, studied the effect of exocyst70A3 gene in plant root systems to help fight climate change

Muhammad Ibrahim Anwar, MacDonald Drive Junior High studied electrocoagulation

VIRTUAL FAIR (CONTINUED)

There are clearly different ways to deliver online versions of science fair competitions. For the YSC Online fair, students introduced themselves and their project with a short one minute video and then uploaded their project which was later judged for awards. In some parts of Canada that held regional fairs, participants were required to submit a video of themselves explaining their project. Neither of these versions however involved any question and answer session with judges, live or otherwise.

Claire Bates and Peter Noel, both from Holy Spirit High, won a YSC Award for their study on the effect of gender on colour perception

Both of the NL Virtual science fairs, in contrast, involved students presenting their projects as a slideshow in real time in Google Meets. The students had the option to be on camera (or not) to explain their projects and then answer judges' questions in real time. For the Eastern virtual fair, students were divided into groups so that presentations could take place concurrently.

This demonstrated that this virtual fair model is scalable. The NL format is a good representation of a physical fair and allows for a more authentic and meaningful experience than one that is not carried out in real time or does not involve a question and answer session with judges. This is a template we plan to use in the future. This is an option for science teachers to host an online science fair in 2021. Please reach out if you want more information.

Thanks to everyone who participated, organized, mentored students, judged, and provided prizes.

STEMFEST WEST 2020

Participants at STEMFest West 2020 gather in the library of Corner Brook High School. A great learning opportunity was had by all!

The Math-Science Special Interest Council (MSSIC) has had great success with their Professional Learning offerings within the Eastern region of the province. While we have had interest and participation from other regions of the province, the executive wanted to expand service to these members. From this idea, "STEMfest West" was born. This event was held at Corner Brook Regional High School on the morning of February 29th. Teachers gained a variety of experiences and tools to use in their teaching of Science and Math.

Participants represented a wide geographical area. Teachers came from Stephenville, Doyles, Kippens, Corner Brook, York Harbour, Rocky Harbour, and Grand Falls – Windsor. MSSIC was pleased to be able to offer travel subsidies to help individuals attend.

The schedule permitted teachers to attend two 90-minute sessions each. Many participants commented that it was hard to choose just two! Thanks to the following who offered very interesting sessions:

Matthew Griffin presented "Scratch Jr.", a visual programming language in which children ages 5–7 can program their own interactive stories and games. While doing this, they are developing skills in sequencing, problem solving, self-expression and collaboration.

Annette Warren presented "Scratch for Beginners". In this session, participants collaboratively learned to use the visual block-based computer programming language, Scratch, for project-based learning.

Patrick Wells facilitated a session, "Using Google Sheets for Projects and Lab Presentations". In this session, participants reviewed the basics of experimental design, data collection and analysis and producing eye-catching charts, graphs and tables.

Patrick Wells also led a "Lessons from Beachcombing" session. Participating teachers left with free Ocean Resource Kits and hands-on activities developed by a team of teachers, researchers, scientists, and members of local science organizations.

A planned session on how to set up a First Lego League had to be cancelled due to the unavailability of the presenter. We look forward to offering this session at a future MSSIC event. Teachers reported a high degree of satisfaction with their experiences at STEMfest West and they are looking forward to the next MSSIC opportunity!

MSSIC would like to thank our sponsors for this event, as well as our many volunteers. Our appreciation goes to Johnson's Insurance, who provided the snack, Let's Talk Science, who provided help with prizes, and the NLTA, who provided funding. Several participants received prizes and one participant received a Chromebook! A special thanks to MSSIC President, Yvonne Dawe and to Executive Member, Tracey Payne, whose work behind the scenes was instrumental to the success of the event. Thanks to all those who helped make STEMfest West a success!

STEMfestNL

STUDENT FEATURE: NICHOLAS FLOWERS–DOUBLE SCHOLARSHIP WINNER

Nicholas Flowers, Amos Comenius Memorial School, Hopedale, Nunatsiavut.

Nicholas Flowers is a grade 12 student from Amos Comenius Memorial School in Hopedale, Nunatsiavut. Nicholas was a recent recipient of 2 prestigious scholarships to be used to cover the costs of his post-secondary education. He received a STEAM Horizon Award as well as the MUN Alumni Entrance Scholarship. These awards are valued at $25,000 each. There are only 5 STEAM Horizon awards given each year; the other 4 went to students in Ontario this year.

The criteria for the STEAM Horizon Awards: recipients will have inspiring achievements in the fields of science, technology, engineering, arts, and math. These achievements could be formally recognized – a science fair win, a published app, a patented invention, etc. or they could be less formally recognized – the founding of a local coding club, developing a course for kids, or creating a local interactive art installation. Regardless of the accomplishment, it must reflect passion and illustrate a positive impact on the community. https://steamhorizonawards.ca/. For the single MUN Alumni Entrance Scholarship the recipient must have an early admission average of 90% or higher, a strong extracurricular involvement and demonstrated leadership contributions to school and community in Levels I, II, and III.

Nicholas is a strong leader, both inside and outside of his school. He has developed an after school science club designed for kindergarten to grade five students to help them enhance their interest in the sciences. Before the pandemic he had also started a youth group which met one evening a week. He was also invited to speak at the "Good at Learning Good at Life Learning Leaders Conference" held in St. John's this past March.

In the spring of 2019 Nicholas was awarded a Regional Student Leadership Award. He was also chosen to attend the Canadian Student Leadership Conference in British Columbia September 2019. The summer of 2019 Nicholas was a member of the Students on Ice Expedition to Greenland and due to his positive experiences he actively promoted the program and encouraged students in our school to apply. He spent a great deal of time after-school with the students who were interested in applying for this year's expedition; he helped them to complete their applications.

Nicholas worked as an archaeological assistant during the summer of 2018 and was asked to give a presentation at the Inuit Studies Conference in Montreal in October 2019 regarding the tradition/transition archaeology winter research project in Hopedale. He is also overseeing the artifact cataloguing from the 2007 excavation.

Nicholas has maintained a strong connection to his Inuit heritage and traditions by learning how to sew various pieces including traditional seal skin boots and coat (silapâk). He wears both of those items for his school based choir performances as well as during his involvement with the community Senior Inuttitut Choir. He also learned how to make snowshoes and assisted in a school based workshop teaching his peers how to do so.

Nicholas' passion for learning about his Inuit heritage has grown not only to include the arts but also the geology surrounding Hopedale. Nicholas has collected several rock samples including Rose Quartz and Labradorite. He learned how to use the school's rock tumbler and has transformed his samples into beautiful pieces of jewelry. The proceeds of their sale is going to the school's graduation celebration and to help support the Moravian church programs. He carved a Kullik (traditional soapstone lamp) and used it as a part of his science fair project in which he investigated the fuel value of seal oil. This project garnered recognition, locally and nationally.

(see **Student**, page 11)

GREAT PD (CONTINUED FROM PAGE 8)

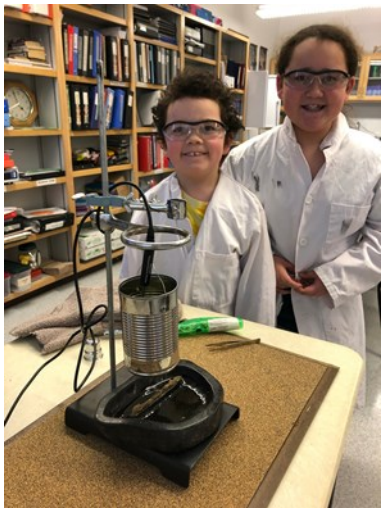
On May 9, Nicholas competed in the very first NL Virtual Science and Technology Fair where he won "Best of Fair" and $500 first place prize. https://enstf.ca/2020-virtual-nl-science-fair/

Had the 2020 Canada Wide Science Fair not been cancelled he would have joined Science Team NL as the first student from Labrador to compete on the national level. Instead Youth Science Canada organized an Online STEM Fair in late May where Nicholas was one of 5 students (4 projects) from this province to be recognized for having an outstanding project.

https://makeprojects.com/ysc/project/relighting-our-history-discovering-the-fuel-value-of-seal-oil

Nicholas' future plans include pursuing a degree in Environmental Sciences at MUN's Grenfell campus in Corner Brook. He also intends to remain very involved in his community and will continue to pass on the Inuit traditions he learned from his grandmother to the young people of Hopedale. With so much success already, coupled with his passion for learning, it is clear that Nicholas will be instrumental in keeping his heritage alive for the future generations of Nunatsiavut.

More information on Nicholas and his accomplishments can be found in a number of media resources including CBC St. John's Morning, CBC Labrador Morning, CBC News, https://www.cbc.ca/news/canada/newfoundland-labrador/seal-oil-virtual-science-fair-1.5494080 and most recently the Telegram's Lifestyle 20 questions piece: https://www.thetelegram.com/lifestyles/local-lifestyles/20-questions-with-hopedales-nicholas-flowers-459218/



Samuel and Laura Winters participate in afterschool elementary science activities organized by Nicholas Flowers.

Nicholas and his grandmother, Andrea Flowers.

FLOATING AND SINKING FOR KIDS: A CONCEPTUAL CHANGE APPROACH FOR DEEPER LEARNING

The concept of Deeper Learning presents a set of competencies and describes a process of learning that promotes these competencies. These competencies include (i) mastery of core academic content. (ii) critical thinking and problem-solving skills, (iii) collaboration skills, (iv) communication skills, (v) learning how to learn, and (vi) developing academic mindsets. The National Research Council Committee considered deeper learning a progression "through which a person becomes capable of taking what was learned in one situation and applying it to new situations – in other words, learning for transfer" ((NRC, 2012, p. 5).

In a classroom setting, deeper learning attributes to intentional pedagogical efforts by a teacher leading to student learning that "involves higher -order cognitive processes to reach a deep understanding of core academic content and key issues of the contemporary world" (Fullan & Gallardo, 2017, p. 7). Creating conditions for deeper learning in a science classroom includes helping learners master the key competencies "in order to develop a keen understanding of academic content and apply their knowledge to problems in the classroom and on the job." (The William and Flora Hewlett Foundation, 2013). Here I describe a concept building and conceptual change approach, which allows deeper learning. In this approach to teaching science, learning experiences are designed to help students build individual concepts in a specific sequence to facilitate higher-order cognitive thinking leading to a conceptual understanding of the core concepts and ideas related to floating and sinking.

The topic of floating and sinking is included in most of the science curricula for K-6 learners around the globe. In Newfoundland and Labrador, this topic is introduced very early at the Kindergarten level, however, not as a knowledge outcome but a context to achieve certain skill outcomes (202-1, 203-1). The topic is formally included as a topic in the Grade 2 science curriculum: "Demonstrate an understanding of sinking and floating objects by solving a related practical problem" (29.0). The idea of floating and sinking is complex and involves a number of science concepts, such as mass, volume, density, buoyancy, and Archimedes Principle.

The research on students' misconceptions and alternative ideas shows that students have difficulty understanding floating and sinking, which usually stem from inaccurate or incomplete ideas about underlying concepts such as mass, volume, density, pressure, and buoyancy. Young learners think that all light objects float and the heavy objects sink (Thompson & Logue, 2006). They often mix up size and density and believe that big objects sink and small objects float. Some learners think that hard objects sink while soft objects float. Some of them think that hollow objects (objects with air in them) float. Similarly, for some learners the condition for floating an object is a large amount of water; and some find it hard to understand the effect of the density of fluid on flotation (Haysom & Bowen, 2010, p. 194). Moreover, the concept of buoyancy is abstract and difficult to grasp for young learners. Young learners often have difficulty in reasoning with abstract ideas, such as buoyancy; therefore, there is a need to provide opportunities to the learners to help them distinguish between concrete, observable and unobservable properties (Bliss, 1995) to formulate explanations to describe this abstract idea.

In the following sections, several related concepts and ideas are presented in a sequence (see Table 1), and six learning activities that can help young learners develop a conceptual understanding of floating and sinking.

See (**Floating and Sinking for Kids**, page 13)

"The research on students' misconceptions and alternative ideas shows that students have difficulty understanding floating and sinking, which usually stem from inaccurate or incomplete ideas about underlying concepts such as mass, volume, density, pressure, and buoyancy."

FLOATING AND SINKING FOR KIDS (CONTINUED)

1. Effect of Volume on Floating and Sinking
Dancing Raisins is a popular activity used by many elementary teachers; a simple google search can show you many webpages, activity sheets, and videos around this activity. Inspired by Banchi & Bell (2008), this activity is presented in the form of a three-step inquiry sequence: Predict-Observe-Explain (POE). Students will be provided with a POE sheet to record their responses, which can be in print or a digital form (e.g., Google Form). Place materials (raisins, a clear glass full of water, and a clear glass full of soda) in front of the class so that every student can see them.
Predict: Ask students to predict: what will happen if raisins are placed in the water? What will happen if you place raisins in soda? State and explain the reasons for your prediction.
Observe: After students have recorded their responses, place a few raisins in water first, and let them record their observations. Similarly, place raisins in soda and ask students to observe how raisins behave. Observing raisins "dancing" will engage learners' higher-order thinking skills, and each learner formulates an explanation.
Explain: Place them in small groups so that they can practice their communication skills and refine their explanation after discussing and comparing their reasoning and interpretation with peers. The following questions can help in conducting a discussion: Compare your observation with your prediction after the experiment. Is there an agreement or disagreement? Explain with reasons. Why did this happen? Explain your ideas. What did you learn about floating and sinking?

Collect students' responses and facilitate a discussion leading to the idea that when placed in soda, bubbles attach to raisins, increasing the volume and decreasing density (mass/volume) of the raisins, causing raisins to float in water.

Table 1: Concepts Related to Floating and Sinking and a Progression Sequence

Related Ideas	Learners Develop a Conceptual Understanding that . . .
Buoyancy & Archimedes Principle	An object immersed in water [or a fluid] is acted upon by an upward force [buoyant force] equal to the weight of the fluid displaced by the object.
	An object immersed, partially or fully, in water [or a fluid] experiences an apparent loss in weight that is equal to the weight of the fluid displaced by the immersed part of the object.
Relative Density - Density of the Object & the Fluid	Objects denser than water [fluid in which they are submerged] tend to sink, while objects less dense than water [fluid in which they are submerged] tend to float.
Density of the Fluid	An increase in density of liquid by adding salt caused regular can of coke to float.
Density of the Object	An object with less density is more likely to float while an object with high density is more likely to sink in water.
Mass & Volume	A decrease in mass, as is the case with diet coke, decreases the density (mass/volume) of the object, causing diet coke to float in water.
	Bubbles in soda attached to raisins increased its volume, and decreased the density (mass/volume) of the object, caused the raisins to float.
Mass & Volume	Bubbles in soda attached to raisins increased its volume caused the raisins to float.
	Diet coke has less mass as compared to regular coke. A decrease in the mass of diet coke allowed the can of diet coke to float in water.

2. Effect of Mass on Floating and Sinking
Another simple and popular demonstration involving diet and regular soda drink is used for this step of the sequence, which is modified as a POE activity to allow the inquiry approach. The materials (a clear container/tank with water, can of diet coke, and a can of regular coke) are placed in front of the class so that all students can see these.

Predict: Ask students to respond to the following questions, and note their responses in the POE sheet: How will the cans behave when placed in the tank of water? Why?
Observe: Then place both the cans in the water tank, and pose students this question: What did you observe? Describe and give reasons for your observations. Students are required to note their observations in the POE sheet.
Explain: In small groups, students discuss their ideas, respond to the following questions, and formulate possible explanations: Why did this happen? Check the ingredients list on both the cans and find any differences? What did you learn about floating and sinking?

Collect students' responses on the above questions and facilitate a discussion leading to the idea that a decrease in mass in case of diet coke decreases the density (mass/volume) of the can of diet coke causing it to float.
Note: The students observe that a can of regular coke can contains 12 gm of sugar. This information can be used to address health objectives and discuss the harmful effects of sugary drinks on human health.

(see **Floating and Sinking for Kids**, page 14)

FLOATING AND SINKING FOR KIDS (CONTINUED)

3. Effect of Density [Mass and Volume] of the object
In this activity, students are asked to use the results from the above two activities (1 & 2), and further develop their understanding of the role of object density in floating. Questions asked may include:

> Calculate density (Mass/Volume) of the objects (raisins, diet coke, and regular coke) in the above activities. Draw a conclusion based on the pattern emerging from the data about the floating of the objects in the water.

Engage students in a discussion by collecting their responses about the density of each object. Combined with their previous results, students are able to develop the concept that when placed in soda, bubbles attach to raisins increases their volume. The increase of volume decreases density (mass/volume) of the object, causing the raisins to float in water. Similarly, a can of diet coke has less mass as compared to the regular coke can, so the density (mass/volume) of diet coke is less than regular coke, allowing the can of diet coke to float.

4. Effect of the Density of Fluid
This activity is an extension of the above activity 2. In this case, after observing the diet and regular coke cans floating or sinking in water, salt is added in the water tank to change the density of the fluid (water) in the tank. Here is the POE sequence to help students understand the effect of fluid density on floating and sinking.
Predict: Students are asked to respond to the following questions and note their responses in the POE sheet: How will the cans in activity 2 behave when salt is added in the water tank? Why?
Observe: Then add salt in the water tank and pose students this question: What did you observe? Describe and give reasons for your observations. Students note their observations in the POE sheet.
Explain: in small groups, students discuss their ideas, respond to the following questions, and formulate possible explanations: Why did this happen? What did you learn about floating and sinking?

After observing the regular can of coke moving up in the water after salt is added, students can develop a conceptual understanding that an increase in density of liquid by added slat caused the regular coke can to float. Hence, the density of fluid also affects the floating and sinking of objects.

5. Relative Density: Density of the Object & Fluid
In this activity, provide students information about the density of water (1 g// cm^3). Integrating mathematics, ask them to:
Calculate the density of the objects provided (to make it easier for young kids regularly shaped objects will be helpful)
Compare the density of each object to the density of the water. Note whether this value is greater than or less than the density of water.
Test each object to check if it floats or sinks, and record the observations in the tables provided.
Write a conclusion about floating and sinking of these objects in the water?

Object	Density g/cm^3	< or > Water Density	Sink or Float In Water?
Wooden Cube			
Rubber/Eraser			
Ice Cube			
Aluminum Cube			

Which of these objects will float in Cooking Oil (Density =0.93 G/mL)
Engage students in a discussion about their findings and responses to the above questions. This will help them understand that object denser than water [or fluid in which they are submerged] tend to sink, while objects less dense than water [fluid in which they are submerged] tend to float.
NOTE: A PhET online interactive simulation (https://phet.colorado.edu/sims/density-and-buoyancy/buoyancy_en.html) by Colorado University can be used for this activity, which is particularly suitable for remote teaching in the era of COVID-19.

Effect of Buoyancy
Students need to explain floating in terms of buoyancy and/or buoyant force (Archimedes Principle), which involves clearly communicating that the object is floating because it is pushed up by a force (buoyant force), which is equal to the weight of the water displaced. The concept of buoyancy is abstract, and there is a need to make it observable for students. We can help students feel it by holding the object underwater and then release it, and connect it with their experience of swimming and feeling of loss of weight.

See (**Floating and Sinking for Kids**, page 15)

FLOATING AND SINKING FOR KIDS (CONTINUED)

However, for a deeper understanding, we need to help students understand water displacement when objects are immersed in a fluid, and then provide an idea to estimate the buoyant force and compare it with the weight of displaced water [fluid]. The following is a POE sequence to help students understand buoyancy and overcome some of their misconceptions.

Using online interactive simulation PhET (https://phet.colorado.edu/sims/density-and-buoyancy/buoyancy_en.html) by Colorado University, the concept of buoyancy can be made visible to the students.

Ask students to open the online simulation, and select a block of wood with a specific volume and place this block in water, then click the checkboxes for gravity and buoyancy and force values. Record the values in the table provided below.

Repeat the same process for creating a brick block, an ice block, an aluminum block, and a Styrofoam block of the same volume.

Ask them: Do you see a pattern in the data? What conclusions can you make from this data? What did you learn about floating and sinking?

Engage students in a discussion about their findings and responses to the above question. This will help them understand that the buoyant force was equal to the weight of the water displaced. Moreover, they can also find that buoyant force was always equal to gravity for the objects that float.

Screen capture of PhET buoyancy activity simulation.

Object	Weight / Gravity Mass	Buoyancy	Sink or Float?
Wood			
Brick			
Ice			
Aluminum			
Styrofoam			

NOTE: This activity involves the ideas of force and gravity, so is more suitable for older children (e.g. Grade 8 science "Fluids" unit).

Further Extension of Floating and Sinking

Young learners tend to build on ideas to develop a deeper understanding of floating and sinking. Therefore, it is suggested to select concepts and ideas carefully and thoughtfully, according to the age and grade level of the students, keeping the above sequence in mind.

The new K – 6 science curriculum in Newfoundland and Labrador suggests using Design Challenges. A popular design challenge for floating and sinking is Building Boats. Research in science education shows that if learners have developed an understanding of the relevant science concepts before starting a design challenge or parallel to it, they use the design process thoughtfully, and the quality of the product is usually improved.

In addition to the concepts discussed above, surface tensions, surface area and pressure are also linked to floating and sinking, specifically to buoyancy or buoyant force. However, introducing multiple concepts at one time, particularly abstract concepts, such as gravity and surface tension, for which they have not developed an understanding, may cause more harm than good. The challenge for a science teacher is to keep focus on the concept, which is the goal of a lesson, and to avoid side talks on another concept to help the learner build deeper conceptual understanding.

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