STEM ED MAGAZINE

CULTIVATING COMPETENCY DEVELOPMENT

Explore tools for Constructivism, Inquiry, and STEM.

UNPACKING INQUIRY

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GIVE ME SOME SPACE!

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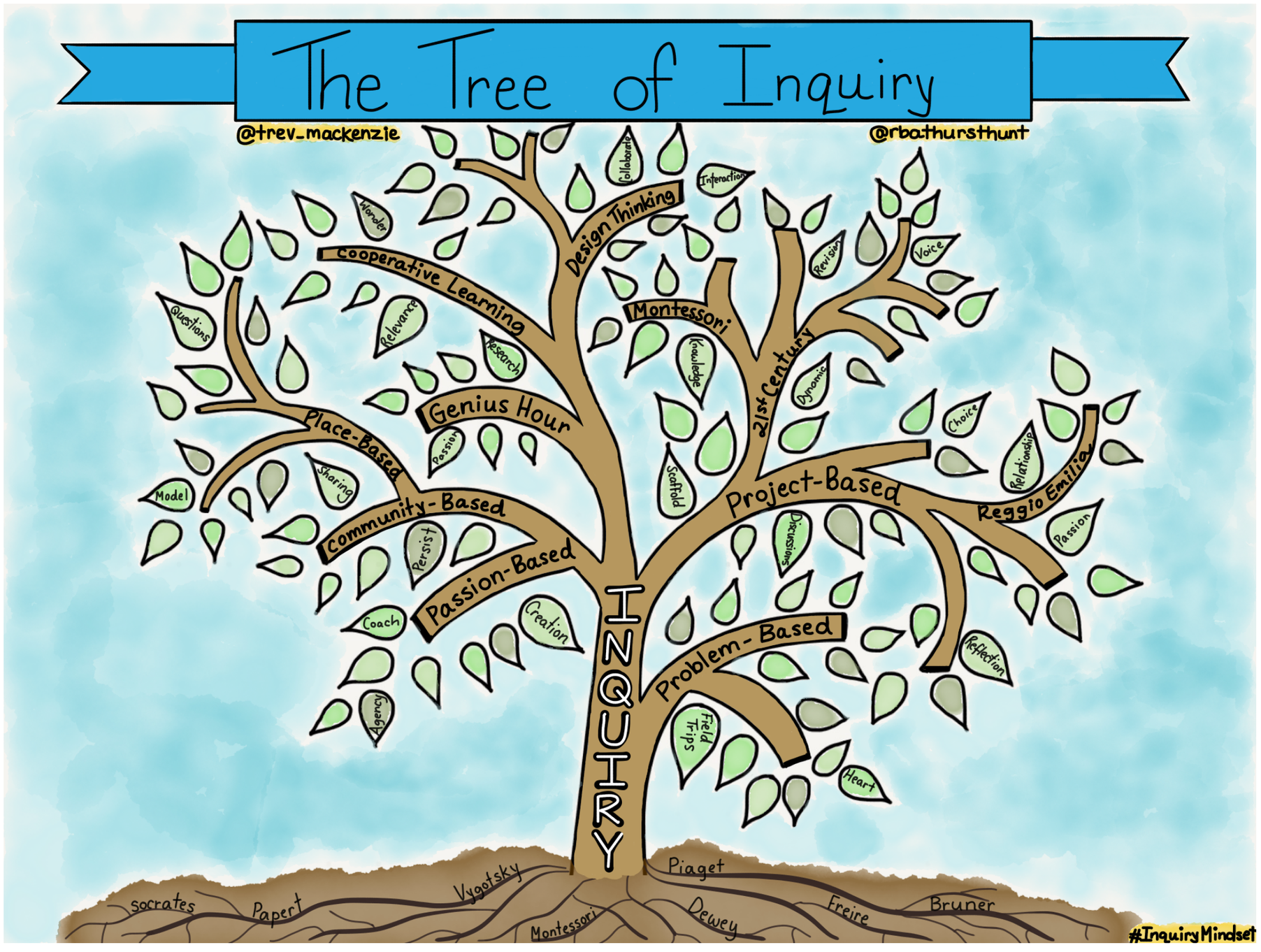


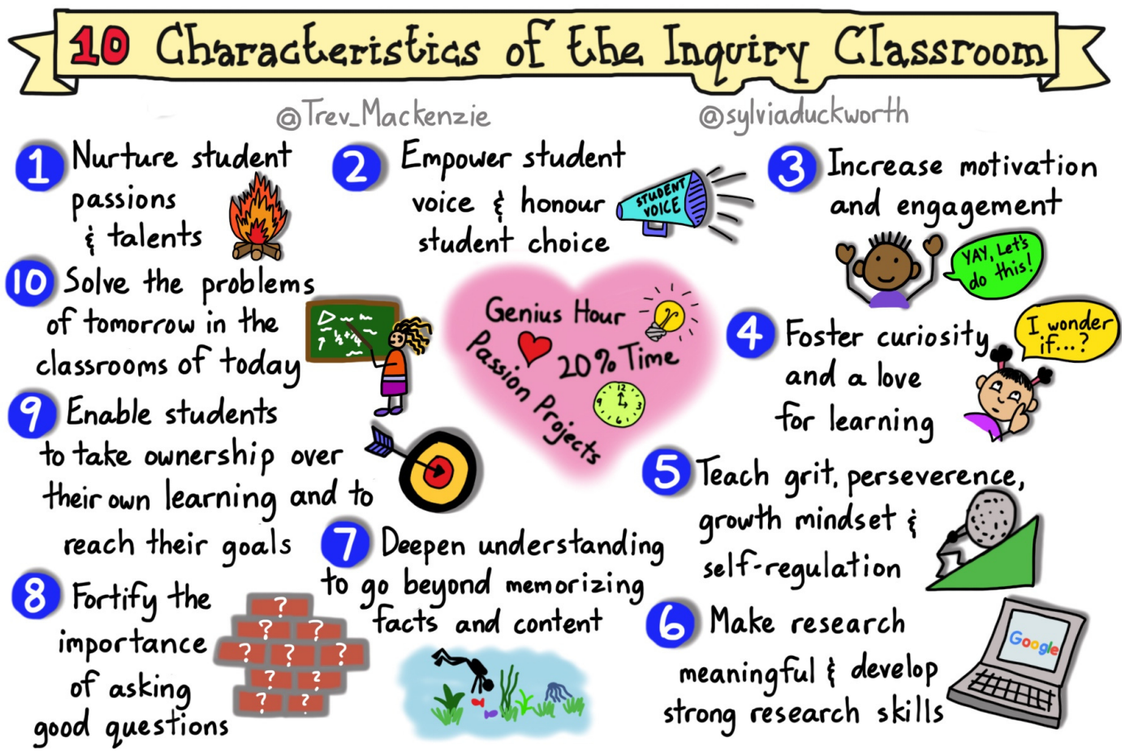
CULTIVATING COMPETENCY DEVELOPMENT: TOOLS FOR CONSTRUCTIVISM, INQUIRY, AND STEM

TREVOR MACKENZIE

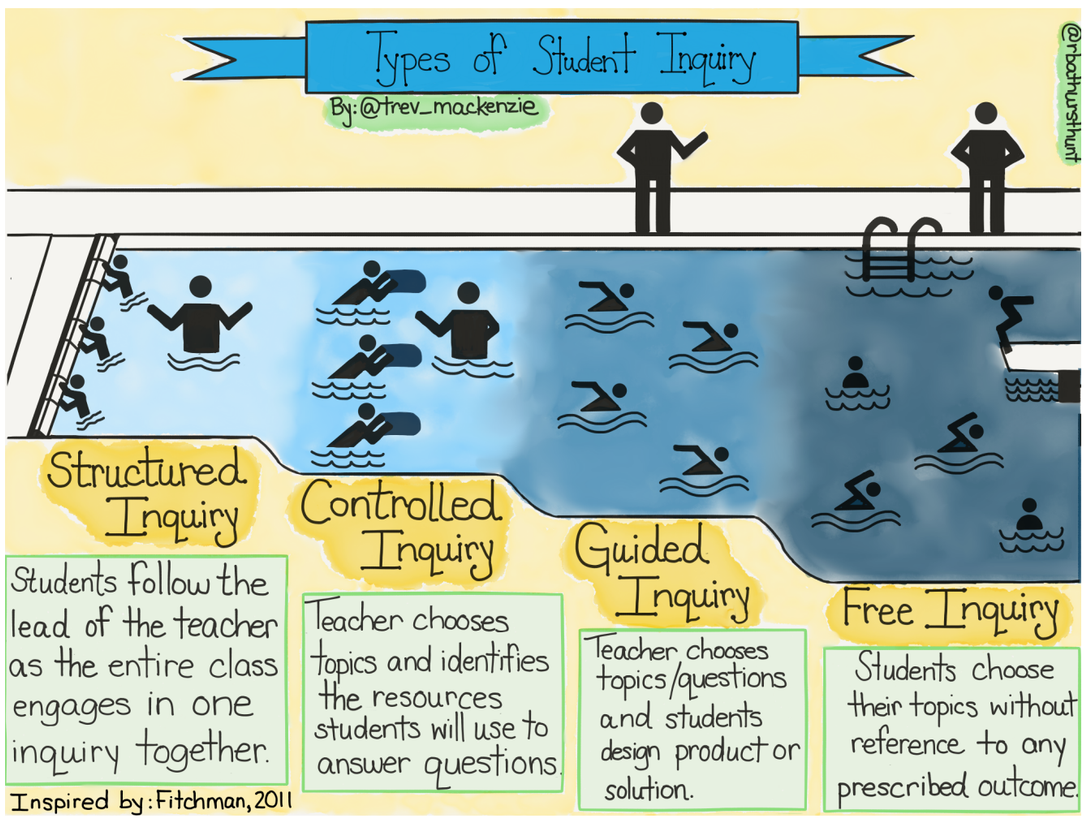
Inquiry-based learning is nothing new. The roots of constructivism go back many generations, centuries even, to theorists and philosophers who have had an undeniable impact on my teaching. Dewey, Piaget, Vygotsky, and Freire come to mind when I reflect on the underpinning values and beliefs that shape the experiences I aim to cultivate with my students. When I look at the books in my office I see a deep and rich school of thought that includes such contemporary voices as Kath Murdoch, Guy Claxton, Ron Rittchart, and Art Costa. Our current educational landscape is flourishing with rich dialogue, sharing, and provoking that is both inspiring and informed. Inquiry teachers today are truly standing on the shoulders of giants.

And make no mistake my STEM friends: you are constructivist educators. The experiences you cultivate are rich in student agency. The challenges your students aim to unpack and solve are authentic, relevant, and contextual. The content of your curriculum comes alive for your students as they encounter rich connections between self, peers, community, and the world. The wonders, curiosities, and questions that bubble up in your classrooms offer personally meaningful entry points for each of your students to reflect on their learning and guide them through their schooling experience.

STEM is an inquiry-based learning framework and in that, as we engage in these conversations with each other as practitioners as well as with our students as active partners in co-designing the learning experiences and environments, we uncover similarities and alignment.



An undeniable common ground for us to explore is the need for us to support students in sharpening particular skills that will benefit them in taking on more agency over learning. If we hope for students to experience inquiry through the lens of STEM, we understand that we must simultaneously cultivate experiences for particular competencies, dispositions, or habits of mind to form. As students take on more agency over learning they will flex these inquiry skills, as my inquiry friend Kath Murdoch refers to them. Just as they would exercise muscles as they activate their bodies, in inquiry students activate particular competencies as they engage in exploring their wonders and curiosities. Bringing these skills to the surface of learning for our students and engaging them in identifying these competencies, unpacking their nuance and sophistication, and reflecting on their growth in each allows learners to connect what they're learning to how they learn and who they are as learners. Take a moment to let that soak in.



In my classroom setting, students and I have identified seven such skills that help shape the learning experience. Early on in the school year I facilitate a co-design conversation where, using guiding questions to help engage students in accessing prior knowledge and to reflect on their lives and their learning, we identify the skills we will sharpen throughout our time together. This past school year we settled on: collaboration, communication, creativity, curiosity, critical thinking, empathy, and self-control.

Identifying this series of competencies is one step. Unpacking the nuance and sophistication of each is another. These skills cannot be deeply understood, nurtured or acquired without exploring what they look like, sound like, and feel like across a myriad of contexts. For example, one cannot simply say they are a "strong collaborator" without reflecting on the many micro moves, behaviours, and decisions one makes when engaged in collaborative experiences. At times the collaborator takes the lead and helps direct a group or the learning process yet at times they step out of the spotlight and engage in focused listening, questioning, and observation. The depth of these skills call on us to explore them together *with* our students.

To aid learners in grasping the layers to each skill we must discuss this sophistication at length. With my students we build identifiers that help us reflect on how we flex each competency and to what degree or in what manner we may be doing so. These identifiers provide the colour to each competency. We don't simply have a competency or don't have a competency. Competencies are not black or white. Competencies are a joyful spectrum of colour, a series of vibrant yet subtle differences that are shaped by experiences. The indicators we create help students understand this spectrum and this subtlety. They allow them to set personalized goals, track growth, gather evidence, and ultimately take on more agency over learning. Let's look at a few examples of what some of my students have come up with now:

Collaboration looks like...

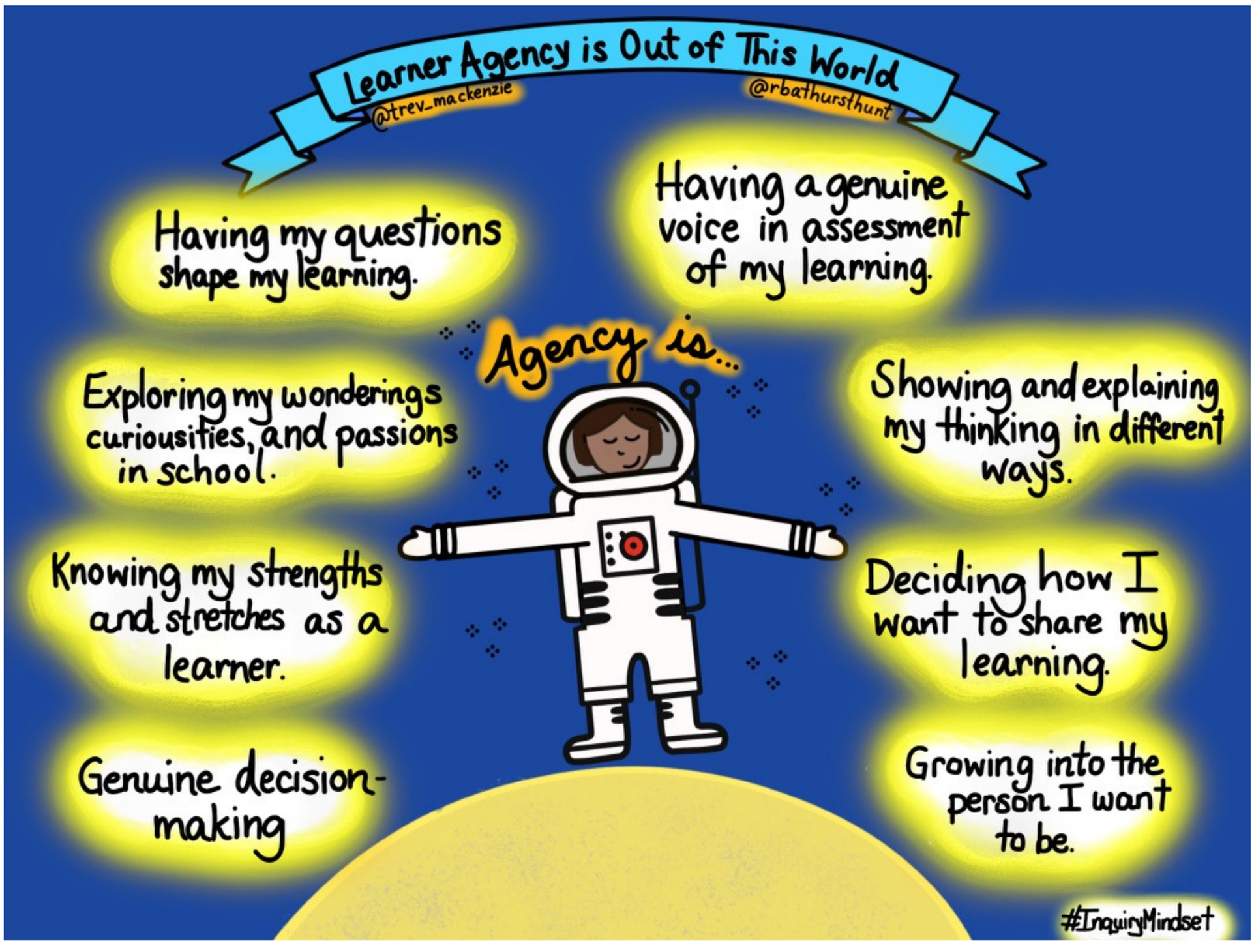
- Actively listening
- Open mindedness
- Constructively criticizing
- Teamwork
- Engaging and disengaging
- Positively reinforcing
- Communication
- Clarity
- Self-control
- Strong organizational skills
- Asking questions
- Flexibility
- Patience
- Getting along with others
- Not getting along with others (at times)

Communication looks like...

- Sharing ideas
- Asking questions
- Active listening
- Be able to work and involve others
- Not discarding other's ideas
- Being engaged (mentally and physically)
- Being ready to engage with others
- Speaking in turn
- Being respectful
- Openly voice your thoughts and opinion
- Expressing yourself with detail and clarity
- Speaking to and with others and not at them
- Writing, speaking, showing, creating and digital literacy - all literacies

Creativity looks like...

- Thinking outside of the box
- Alternative learning methods
- Unique presentation styles
- Sharing your ideas with others
- Experimenting with different mediums
- Self-expression
- Taking inspiration from others
- Using your environment, surroundings and resources to create
- Creativity is found in all shapes and forms
- Surrounding yourself with inspiration
- Divergent thinking
- Coming to a problem from a multitude of angles and perspectives



In my classroom we make these competencies visible as large posters that students have created and attached the indicators to. These posters and indicators are a visual cue for students to reflect on the learning as it occurs, helping them identify their use of each skill and to what degree or sophistication they are engaging it to. Further, these visuals help me coach and model for students as I observe them flex their inquiry muscles. I can scaffold, differentiate, draw our attention to something helpful or ask a guiding question to engage students in their own reflection. Making these competencies visible helps bring them to life for learners and in doing so, helps them take on more agency over their learning.

In the constructivist classroom it is this type of partnership over the learning that allows students to discover a meaningful sense of belonging in their schooling. Competency development helps pave the way. These ideas are nothing new nor innovative. Rather, they are timelessly sensible and helpful. I encourage you to bring this language, these conversations, and this co-designing of the learning to your STEM practice. Align them with your constructivist values. Actively engage them in the intentionality and planning you bring to your teaching. Help your students explore them within their wonders and curiosities and together, see where the learning takes you!

Trevor MacKenzie

Trevor MacKenzie is an experienced teacher, author, keynote speaker and inquiry consultant who has worked in schools throughout Australia, Asia, North America, South Africa and Europe. Trevor's passion is in supporting schools in implementing inquiry based learning practices. He is a highly regarded speaker known for his heartfelt storytelling, kind demeanour, and student-first philosophy. Trevor's graduate research focused on identifying and removing the barriers to implementing inquiry-based learning in the K-12 setting. He is an inquiry practitioner currently as a teacher with the Greater Victoria School District in Victoria, Canada. He has three publications: Dive into Inquiry; Inquiry Mindset Elementary Edition; Inquiry Mindset Assessment Edition; all published by Elevate Books Edu. He has vast experience supporting schools across several years in implementation strategies in public schools, international schools, and International Baccalaureate programmes (PYP/MYP/DP). Trevor MacKenzie is an award winning English teacher who believes that it is a magical time to be an educator. By increasing student agency over learning, weaving in strong pedagogy, transformative tech use, and sharing learning to a public audience, Trevor's learners are ready to take on important roles in the 21st century.