

An Annotated Learning Journey within a Kindergarten Classroom

Setting the context: Kindergarten

Ontario Catholic School Graduate Expectations: 1d, 2c, 3b, 3c, 3e, 4a, 4b, 4c, 4f, 5a, 5e, 7j
Gospel Values/Virtues: Excellence, Hope, Community, Love, Faith
Personal Development: 1.2, 2.1, 3.2 **Emotional Development:** 1.1, 1.2, 1.3, 2.2, 2.5
Language: 1.2, 1.5
Mathematics Curricular Learning Goals:
 I can compare the size of one object with another using everyday objects and standard objects for measuring. I can explain and represent my thinking.

Revealing the educator's thinking:
 "It had been noted through prior assessment and documentation, that Student 'H' had yet to show comprehension of the concept of measurement. To engage him in these big ideas, I knew a provocation which spoke to his personal interests and strengths was needed. I decided to bring in some Lego "mini-figures" to serve as non-standard units of measurement. The rationale behind this decision was based on Student 'H's love of Lego. We hoped to spark his curiosity and see where the learning would take us with some gentle guided instruction embedded within the inquiry process."
 "We also wanted to make sure the provocation was accessible to a wide group of learners, regardless of background. It needed to be open-ended to allow the educator team to guide the inquiry in a way that respected all students' wonderings and ideas."

The Learning Experience:

The inquiry begins simply: Lego was put out in an interesting manner, with special consideration given to ensure there was enough for careful exploration, but not too much to overwhelm.
 This learning experience will grow as student interest and wondering exists.

How does the provocation kindle an inquiry?
 "I sat close enough to the provocation with my tablet and assessment binder to ensure that I captured the learning and questioning and to further enrich documentation of the experience. Student 'H' was immediately drawn to the table and I heard him clearly say the word, "Emmett", referring to his favourite character. A group of six other students followed him and immediately engaged in building. It is important to note that the grouping was created organically, based on common interest. There was a mixture of both Year 1 and Year 2 Kindergarten students representing a blend of interests."

The Instructional Task:
 Differentiating instruction for those in greatest need results in effective instruction for all students in the class. This open-ended task was chosen to respect the learning journey of each student—and more importantly, one very special student!
 Deep observation and listening to the students' conversations will give invaluable assessment for learning evidence for the educator in order to support professional judgement when making instructional decisions.

The educators wonder...
 "How might we design a learning experience to strengthen each child's own self efficacy toward mathematically thinking and establish a strong Catholic learning community? How might we personalize the learning experience for Student 'H' who is a very kind and sensitive child in the Kindergarten classroom, identified at risk of Autism Spectrum Disorder. He has a severe speech impediment and has shown to have difficulty in social situations and often engages in parallel play. He relies heavily on gestures to communicate. He has expressed an interest in Lego and can often be found at the Block Center during the course of the day."

Planning with the end in mind:
How can a question be designed by educators to provoke the thinking of young children? How does a question designed specifically for one unique child foster wonder and build community for a group of children? Provocation is a technique used by educators to encourage critical thinking. It inspires students to take ownership of their learning, challenge other children's thinking, sparks creativity and creates a reflective environment. When a learning provocation stems from a student's interest/inquiry, it can be an effective way to engage students on a cross-curricular level.

"I observed this initial exploration/building phase, waited and listened, "That's not fair, you have more than me. I only got 4 and you got 1, 2, 3, 4, 5, 6...7!" and "I'm going to build a power-station so I need lots of Lego. Can you give me 4 more pieces?"
 "I was immediately impressed by the meaningful math talk that was taking place. The foundations of **proportional reasoning** were being built right alongside the Lego assembly. This is when I took my cue. I sat next to Student 'H' and addressing no one student individually, held out my hand and wondered aloud."

Activation: "I wonder how many of these mini-figures will fit into my hand?" The students were immediately compelled by the simple query and set out to find the answer.



Revealing the educator's intentional decisions to allow for student-centred collaborative inquiry:
 "Allowing students to struggle and grapple with the inquiry pushes their thinking. Knowing when to intervene requires an understanding of how an explicit question or process will support the learning. As students debated about how to measure accurately, I responded by asking if we could co-construct criteria for our measurement experiment. We agreed upon these three student-created guidelines:
 • We need to make sure there are no spaces in between.
 • We can't mix it up. It has to stand up or lie down. Not both.
 • We can only use mini-figures.
 I didn't give them an answer, we worked through a process of collaboration so the inquiry would be able to continue with an appropriate focus."

Assessment for, as and of Learning:
 The educator is continuously assessing while the students are engaged in their inquiry. There is a moral imperative to allow purposeful talk and observation of student interaction to guide instruction for each student on an individual level. This proactive differentiated instruction is effective when the educator fully recognizes the specific needs of each student.
Differentiated Instruction
 Differentiating means challenging the students to extend themselves as much as it is to focus on the child who needs extra assistance to meet the learning goals.

Activation:

Working on it:

Student 'H' was an active participant during this exploration phase of the inquiry. He initially tried the experiment on his own hand. He tried several variations, first with the mini-figures stacked horizontally and then, looking to what his peers were doing, decided that he would try stacking them vertically.
A group of learners: The open-ended nature of the question sparked a new problem within a problem for the group. Does the orientation of an object affect the size of the space it occupies in a linear measurement operation? The students grappled with this concept for a while. Some students argued that they "needed to stand up straight" for the measurement to be accurate while others argued, "it's better to have them lie down. You can fit more in."
 The educator intervened and suggested co-constructing criteria to build common understanding. Once the criteria were established, the students all agreed that 4 Lego mini-figures could fit into the educator's hand when stacked horizontally or lying down head to foot.
 The educator immediately responded to this conclusion by **extending the challenge**. "Now that you know how long my hand is, what else can we measure in the classroom using mini-figures?" The students went on to measure juice boxes, lunch boxes and Lego pieces.

The Inquiry Grows: A Glimpse of the Process

The Inquiry Grows:

"A large number of students had come to observe and participate in the exploration. Some students branched off to form other sub-groups based on both personal interest and strengths."

"One group, which had demonstrated proficiency in the initial measurement experiment, made it known that they were intrigued to take it to the next level by requesting a measuring tape. The Early Childhood Educator, who had been an active participant in the documentation of the initial query, led this small group consisting of three Year 2 students and 2 Year 1 Kindergarten students (including Student 'H'). The Early Childhood Educator quickly tracked down a measuring tape and the students decided they needed masking tape to record their results on the floor."

"We intentionally did not offer the term 'centimeter' as we kept in mind what was developmentally appropriate for this age group. They set out measuring each other's lengths and comparing the results. By analyzing these students at work, it helped inform our instructional decisions. We needed to continue to respond to each group's individual zone of proximal development, honour their wondering and guide them to take their queries to the next level."

Observations and conversations are essential tools in gathering and documenting evidence of learning.

The professional collaboration between the classroom teacher and the Early Childhood Educator is clear evidence of the care and commitment to planning and instructing focussed on those students most in need!

Inclusion is deeply embedded in this class. The learning experience was designed around what works best for this one specific child, recognizing that, by extension, it would benefit all children.

Differentiated Instruction recognizes the needs of the child and fits the learning experience around the needs and interests. The children are not 'fit into' the learning.

Consolidation:

During the daily "consolidation time" at the learning carpet, the students reflect upon their learning. The educator team responds to their learning by repeating it in a way that supports all students in constructing meaning by making connections to prior learning. Providing photos of students at work and student work samples supports this thinking process.

During one consolidation time, Student 'A' indicated that he was very interested in the concept of measurement and asked if he could demonstrate to the class how "tall" he was? We responded to this request by asking the students to first "guess", how many medium sized blocks tall is Student 'A'?

It was suggested by a student in the initial inquiry group that the blocks all needed to be the same size. We recorded the results on chart paper and then proceeded with the experiment.

This form of student-led consolidation of what we had learned about measurement as a class showed that the students were developing schema which they were able to then use in other contexts. The educator team witnessed an understanding of the need for uniformity of measurement tools, number recognition and counting past 20, comparing lengths and spatial reasoning.

All this learning stemmed from one question designed specifically for the needs of one student!

Consolidating and celebrating the learning of each student remains the cornerstone of this phase of instruction. If a culture of respect and dignity has been maintained throughout the process, each student - no matter their own skill level - can learn from the other.

The consolidation phase is a time for students to construct understanding, but it is a **critical** time for educators to gather evidence (i.e. assessment for learning). The educator team makes instructional decisions to personalize the next steps for each student as well as plans multiple opportunities for practice moving towards assessment of learning to come.

The educator team (Teacher and Early Childhood Educator) meets daily to review documentation to inform where they need to go in their learning journey. Their shared experiences and education make for a strong team that respects one another's strengths, values and God-given gifts.

Next Steps:

During the consolidation process, the educator team discovered other groups had formed. One such group shared and introduced us to a new concept - perimeter. This group was formed by a common need since they were not comfortable using the small non-standard units of measurement such as Lego or the measuring tape and decided that the large wooden blocks were the "best" way to measure their bodies. They placed the blocks on the contours of their bodies and counted how many "went all around us". Other students discovered, through investigation, that how "far across" something refers to an object's width.

As next steps, the educator team scaffolded upon this new learning by putting out various "loose objects" such as glass beads, pinecones, rocks and bolts as non-standard units and observed where the learning would go. Some students decided to make patterns instead, which we honoured and validated by naming and supporting the learning. Others chose to use the new materials to make sense of their new found knowledge, "Look, this line is 1, 2, 3, 4, 5, 6 long. This one is 1, 2, 3, 4, 5, 6, 7 long. Hey, the blue one is longer!" This in turn led to an investigation in measuring distance, when some of the students from the initial mini-figure inquiry on measurement were curious about what would happen if they measured the distance their paper airplanes, marbles and even stuffed animals could travel.

Throughout the inquiry process, students reflected upon both teacher and student-created documentation which in turn kept their personal experiences alive and promoted further investigation and wondering.

By reflecting on this learning, including analyzing documentation, such as, photos, anecdotal notes, quotations and work samples, the educator team was able to see where the students were and where they needed to take them. By differentiating the tasks, they were able to tailor the learning to meet each student's individual needs, thereby respecting the image of the child as rich, competent and resourceful.

Reflection:

"What I was struck with during this inquiry was how important the process of discovery was rather than the "right answer" or product. It didn't really matter if the students all agreed upon how many Lego figures fit in my hand, it was the process of discovery that led to debate, investigation and exploration that was at the heart of the inquiry."

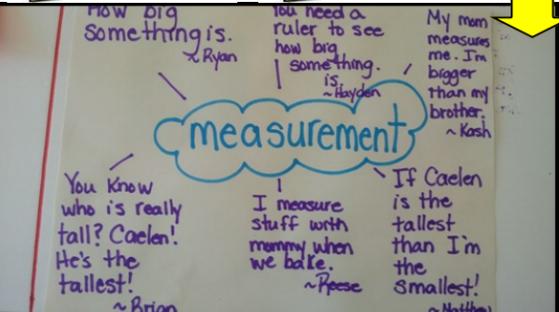
"Through the inquiry process, students were able to discover and learn at a rate that respected their individual needs and varied interests. There was no pressure to find the "right" solution; the real answer of the inquiry was when each child felt a sense of connection with their peers in a non-threatening and open environment which fostered and respected their personal learning story."

A rich environment co-constructed with the students and respecting diversity of the learners, encourages children to think, construct and create on a level which is meaningful in their young lives.

By creating an environment which supports risk-taking and encourages various hypotheses, each child feels worthy, respected and encouraged to explore, investigate and learn.

How tall am I?

Webbing: what we know about Measurement



Recording our estimates and our results



"Student 'H' continued on his own personal path to discovery. He followed the group using the measuring tape and clearly and proudly held it up to his nose and said, 'Mme B, my nose is 100!'"

Throughout this inquiry, which was initiated by Student 'H's personal interests, I assessed not only measurement, numeral recognition, and the foundations of proportional reasoning, but I witnessed huge strides in self-regulation and social skills, such as waiting, listening, sharing and cooperation, all of which had been a personal challenge for this student."

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Contextual Information

Anchoring on the Big Idea:

Measurement is a comparison of the size of one object with another. Students will focus on measurement of length, initially comparing lengths either directly or indirectly and using non-standard units to measure length. The foundations of proportional reasoning will be introduced creating an awareness of comparing and understanding the relationship of dimensions.

Context:

The context of the initial provocation was during the month of May. Students at this point had become quite comfortable with the inquiry model of learning, sharing ideas, documentation of their thoughts, collaborating with one another and the teacher, and taking their learning to new places (e.g. requesting measuring tape). Due to the nature of the inquiry model, there was no set time limit to the learning experience, as we wished to honour the gradual and natural development of the inquiry and see where the learning would take us.

Educator Considerations:

Some things which we needed to take into consideration regarding how we wanted the program delivered, respecting a community of diverse learners and our role as Catholic educators, were:

- Reverence for the child as image of God; reverence for the dignity of the person.
- Document students at work; ensure the program was differentiated.
- Create a culture of high expectations and risk-taking.
- Produce developmentally-appropriate tasks tailored to each child's learning journey.
- Engage all learners by consolidation, communication, and making sense of assessment. Seeing the connections between assessment *for*, *as*, and *of* learning and how this impacts on the dignity of each student.

Mathematical Processes:

"By seeing how others solve a problem, children can begin to reflect on their own thinking (a process known as "metacognition") and the thinking of others." (*The Full-Day Learning Kindergarten Program: Draft Version*. Ontario Ministry of Education. 2010).

Throughout our measurement inquiry students demonstrated that they were problem solvers, who by reasoning and proving their results of the initial measurement provocation, showed how they had made connections to prior knowledge and demonstrated proficiency of the new learning task. With teacher modeling, students were able to reflect upon their learning, communicate results and take it to new areas in the kindergarten environment (i.e. using Lego as non-standard units to measure other items, using standard units of measure to measure body length, using building blocks to measure perimeter of bodies).

Curriculum Goals/Outcomes:

Measurement:

- M2.1: Compare and order two or more objects according to an appropriate measure and use measurement terms.
- M2.2: Demonstrate, through investigation, an awareness of non-standard measuring devices and standard measuring devices (e.g. measuring cups at the water and sand centre, balance scales at the block centre) and strategies for using them (e.g. place common objects end to end to measure the length of the classroom).
- M2.3: Demonstrate, through investigation, a beginning understanding of non-standard units that are the same type but not always the same size.

Contextual Information

Curriculum Goals/Outcomes (continued)

Personal Development:

- 1.2: Demonstrate the ability to take turns in activities and discussions (e.g. engage in play activities with others, listen to peers and adults).
- 2.1: Use a variety of simple strategies to solve social problems (e.g. seek assistance from the EL–K team when needed, develop an awareness of honesty, talk to peers about possible solutions).
- 3.2: Demonstrate respect and consideration for individual differences and alternative points of view (e.g. help a friend who speaks another language, adapt behaviour to accommodate a classmate's ideas).

Emotional Development:

- 1.1: Recognize personal interests, strengths, and accomplishments.
- 1.2: Identify and talk about their own interests and preferences.
- 1.3: Express their thoughts (e.g. on a science discovery, on something they have made) and share experiences (e.g., experiences at home, cultural experiences).
- 2.2: Demonstrate a willingness to try new activities (e.g. experiment with new materials/tools, try out activities in a different learning centre, select and persist with challenging activities, experiment with writing) and to adapt to new situations (e.g. having visitors in the classroom, having a different teacher occasionally, going on a field trip, riding the school bus).
- 2.5: Interact cooperatively with others in classroom events and activities (e.g. offer and accept help in group situations, engage in small- and large-group games and activities, participate in democratic decision-making).

Language:

- 1.2: Listen and respond to others for a variety of purposes (e.g. to exchange ideas, express feelings, offer opinions) and in a variety of contexts (e.g. after read-alouds and shared reading or writing activities; while solving a class math problem; in imaginary centres, while engaged in games and outdoor play, while making scientific observations of creatures outdoors).
- 1.5: Use language in various contexts to connect new experiences with what they already know (e.g. contribute ideas orally during shared or interactive writing, contribute to conversations at learning centres, respond to teacher prompts).

Developing Ontario Catholic School Graduate Expectations:

A Discerning Believer Formed in the Catholic Faith Community

CGE1d Develops attitudes and values founded on Catholic social teaching and acts to promote social responsibility, human solidarity and the common good.

An Effective Communicator who:

CGE2c Presents information and ideas clearly and honestly and with sensitivity to others.

A Reflective and Creative Thinker who:

CGE3b Creates, adapts, evaluates new ideas in light of the common good.

CGE3c Thinks reflectively and creatively to evaluate situations and solve problems.

CGE3e Adopts a holistic approach to life by integrating learning from various subject areas and experience.

A Self-Directed, Responsible, Lifelong Learner who:

CGE4a Demonstrates a confident and positive sense of self and respect for the dignity and welfare of others.

CGE4b Demonstrates flexibility and adaptability.

CGE4c Takes initiative and demonstrates Christian leadership.

CGE4f Applies effective communication, decision-making, problem solving, time and resource management skills.

A Collaborative Contributor who:

CGE5a Works effectively as an independent team member.

CGE5e Respects the rights, responsibilities and contributions of self and others.

A Responsible Citizen who:

CGE7j Contributes to the common good.

The Importance of Environment

“Every person needs a place that is furnished with hope.” *Maya Angelou*

The role of the environment played a vital part of the measurement inquiry. The environment is often referred to as the “Third Teacher”. “A classroom that is functioning successfully as a third teacher will be responsive to the children’s interests, provide opportunities for children to make their thinking visible and then foster further learning.” Fraser, 2012.

The concept of the environment as a participant in the educational experience allows opportunity for student engagement with peers and educators. A thoughtful environment encourages students to respond to intentional decisions made by the educators such as provocations and the use of open-ended materials. A rich environment co-constructed with the students and respecting diversity of the learner, encourages children to think, construct and create on a level which is meaningful in their young lives. When both educators and children find themselves in beautiful, soothing environments, which encourage wonder and discovery, they feel intrigued, respected and are eager to spend their days in this “home away from home”.

Some considerations when establishing an environment in the Kindergarten program are:

- Every part of the classroom should serve a purpose.
- Documentation should be displayed on the walls or portfolios and easily accessible by both students and parents.
- Identify the values at the core of your classroom and build upon these ideas. (Family, God, Respect and Environment)
- The environment should be planned in collaboration with the children.
- The environment should be flexible and easily changeable based on the students’ ever-changing needs and inquiries.



When planning the environment during this measurement inquiry, we ensured that it was co-constructed with the students and respected their diverse backgrounds, interests and strengths. It needed to foster exploration and encourage the students to see themselves as mathematicians, equipped with the tools to solve meaningful problems. Therefore, our learning spaces needed to be mindful for opportunities to explore using open-ended manipulatives, materials to record data (e.g. chart paper, dry erase boards, blackboards, etc.) and mathematical tools (e.g. abacus, calculators, 10 frames, number lines, etc) to show student thinking.

During the measurement inquiry, we were careful to take an “inquiry stance”, which meant respecting each part of the inquiry process and creating an environment which encouraged questioning, research, and reflection. We purposefully placed open-ended materials, provided a wide variety of mathematical tools such as measuring tape and number lines, and were cognizant of the needs of the individual learner by differentiating tasks and materials (e.g. Lego) tailored to student success.

“Environment as the third educator is more than simply designing the physical environment; it is a culture of respect, collaboration, risk-taking, open dialogue, and inclusion. When these key factors are carefully considered and implemented, it creates an optimum environment for discovery and joy!” *The Third Teacher*

“Nothing without joy!” Loris Malaguzzi

Documenting Student Learning

Documentation can be looked at as a map of student learning; allowing educators to know where the road to learning is taking both the educator and the students. Creating documentation gives educators the advantage of revisiting their observations of children's learning as well as their own instructional decisions. Creating documentation enhances reflective thinking for educators and students alike. Documentation makes learning visible. When documentation informs practice, by scaffolding upon children’s natural wonderings, it is considered reflective documentation - analyzing the student learning to see where to go next.

Two types of documentation collected during this measurement inquiry were:

- **Teacher-Centered:** This is when an educator names the learning, maps their personal learning goals based on curriculum outcomes, plans research to support student-led inquiry, and makes sense of children’s understanding. (e.g. observation sheets, webbing, mind-mapping, anecdotal notes, educator blog/website, etc.)
- **Student-Centered:** This is the educator’s story of the movement of children’s understanding. It reveals learning in motion. It may appear to expand and contract, rise, and even disappear, much like a river. It is an authentic representation of student learning vs. visual recounting of inquiry (i.e. storyboards which tell the story of the learning which occurred during inquiry with student-driven theories/discoveries). Student-centered documentation should include quotes of students’ wonderings and discoveries and pictures which show them as active participants in the inquiry process.

For documentation to be truly meaningful it needs to be visible, accessible and reflected upon with students, parents and other teachers. When we make students’ ideas and theories visible it fosters the study of those views which help develop further learning. By reflecting upon photos, listening to personal learning stories, and analyzing work samples, both the educators and students are able to broaden their understanding of the learning which was occurring in the Kindergarten environment.

In relation to the learning story of measurement in this Kindergarten class, documentation played a very important role in helping us synthesize the learning which was happening and aided us in determining how we needed to differentiate instruction. First, documentation was a driving force to the inquiry; it was due to previous assessment/documentation that we knew of Student ‘H’'s love of Lego and that he had yet to demonstrate proficiency in measurement. Secondly, documentation fostered the inquiry by making the students’ learning visible; validating and encouraging the measurement inquiry to grow and develop. Thirdly, documentation deepened the bonds between the educators and the students, creating a reciprocal relationship. By sharing ideas, validating theories and respecting varied points of view, the students were encouraged to take their learning to deeper levels of understanding.

Documentation during our measurement inquiry was transparent; it allowed our learning community to see all stages of our inquiry from planning, participation, scaffolding and assessment. During all stages of the inquiry we collected photos and work samples, reflected upon them collectively, and posted our findings on a documentation panel and our class blog/website. By collecting and reflecting upon documentation it allows us to make the learning visible to the child, parents and our teaching community.

“One thing I have discovered through the practice of meaningful documentation is that it has made me a better educator. By illuminating the building of knowledge in our Kindergarten environment, it has helped me discover my own learning processes as an educator; bringing to light my own strengths and areas of improvement. By reflecting upon documentation with my Early Childhood Educator partner, other teachers, students and parents, I can see where I am in my own personal learning journey and where I need to go to continue upon the path of professional learning.”