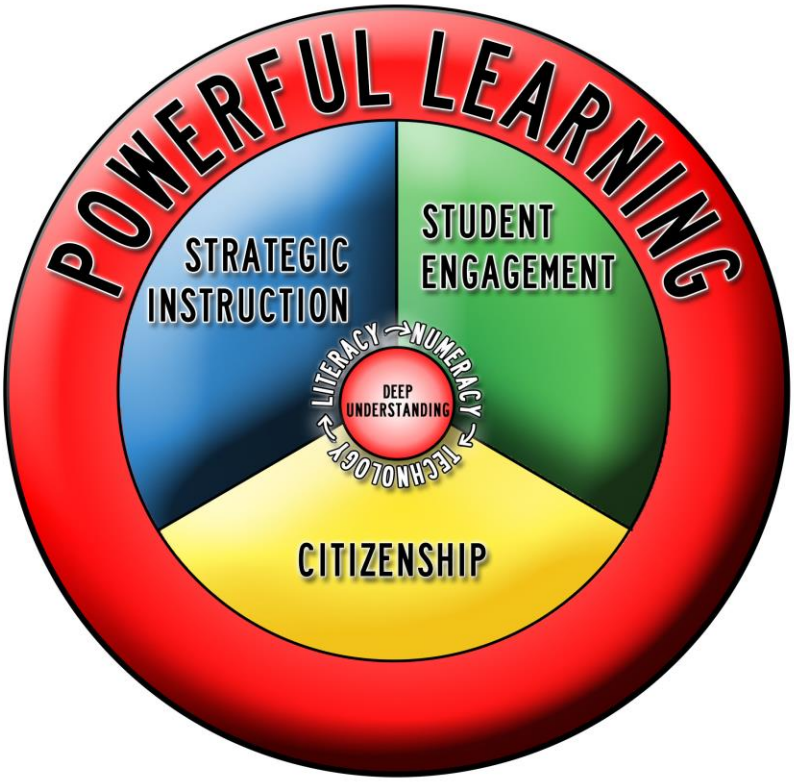
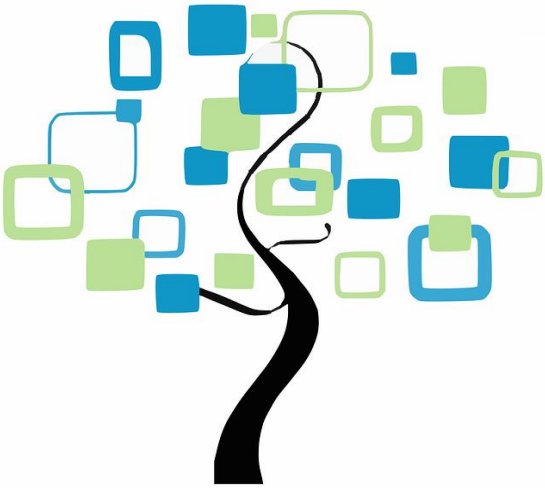
GHSD System Improvement



Golden Hills School Division No. 75

Powerful Learning



Powerful Learning encompasses the design and implementation of engaging classroom experiences that lead students to **a deeper understanding and application of curricular outcomes.** It is the overarching construct that incorporates all aspects of previous system improvement work in Golden Hills School Division that have been found to be effective in increasing student learning including “Assessment for Learning’. Powerful Learning is infused with high impact strategies and learning approaches designed to foster innovation and lifelong learning. It also incorporates 21st century learning principles and embodies the Alberta Education's *Inspiring Education* statement that “all students are inspired to achieve success and fulfillment as *engaged thinkers* and *ethical citizens* with an *entrepreneurial spirit*.” The ultimate goal of Powerful Learning is to foster creators, connectors and collaborators, who critically and thoughtfully contribute to the world.

Students move towards deep understanding when they see and hear other’s perspectives, insights and questions. This requires habits of mind such as open-mindedness and persistence as well as a thinking disposition, including critical and creative thinking. Powerful Learning experiences ensure that students have something to think about creating a complimentary synergy between foundational elements and higher

level thinking. This invites students to construct a deeper understanding by extending ideas, making connections, inferring and by focusing on big ideas or central concepts. The intention of Powerful Learning is to help students acquire the thinking skills necessary to solve problems, make decisions, form judgments and engage in creative endeavors. This enables students to use or apply the learning in new and innovative ways. Reasoning with evidence is a primary focus and is instrumental in developing a "thinking disposition". As well, consideration is given to creating a safe learning environment where unusual ideas are supported, students are provided choice, novelty is incorporated and constructive feedback is provided. These are the basic conditions of a creative learning environment as outlined by Drapeau. (Drapeau, 2011, p 30. As cited in Drapeau, 2014)

The GHSD **Literacy and Numeracy Foundational** Frameworks are intended to ensure that basic skills and knowledge are acquired from which students can move to higher levels of thinking and application. These foundational frameworks support Powerful Learning and provide common guidelines for practices in all classrooms. They are research based and describe the key assumptions/ philosophies, high impact strategies and practices, and assessment approaches identified as best practices in GHSD. (Refer to appendix for copy)

Powerful **learning utilizes technology as a learning tool** in order for students to be able to communicate, research and create deeper understandings and new learning. Students work to discover and master content knowledge in addition to being able to create, extend, innovate and apply this content knowledge. The importance is recognized in being able to use technology well to support teaching and learning (Fullan & Langworthy, 2014). Through the effective use of technology, students are able to select, organize and design learning to be shared both within and beyond the classroom. Technology facilitates the opportunity to shift the emphasis of learning from content and skills to higher order tasks and thinking. Technology can also help GHSD teachers to meet the differentiated needs of learners, enabling all students to experience a successful learning experience.

When designing powerful learning tasks teachers' pay attention to high yield strategies, outlining an intentional sequence of learning activities that starts with the learning outcomes, clusters and aligns with essential learning, as well as utilizes assessment for learning approaches and strategies. Purposeful, ongoing assessment for learning approaches ensures students are gaining a deep understanding of the core learning goals/skills and is imperative to student success. This type of intentional design allows teachers to consider the scope of student needs in their classroom and therefore

allow for multiple entry points so that all students can participate in the task. Core competencies such as: collaboration, communication, critical thinking, and problems solving are integrated when designing units. Design structures such as “Understanding by Design- UBD” (Wiggins & McTighe, 2005) or the “Cascading Curriculum” principles (TC2), are used in planning. This type of design involves the purposeful development of what the teacher and student work will look like as well as what will be collected as evidence of learning. Deciding how students can demonstrate a deep understanding, requires being able to plan for multiple ways of representing and expressing ideas.

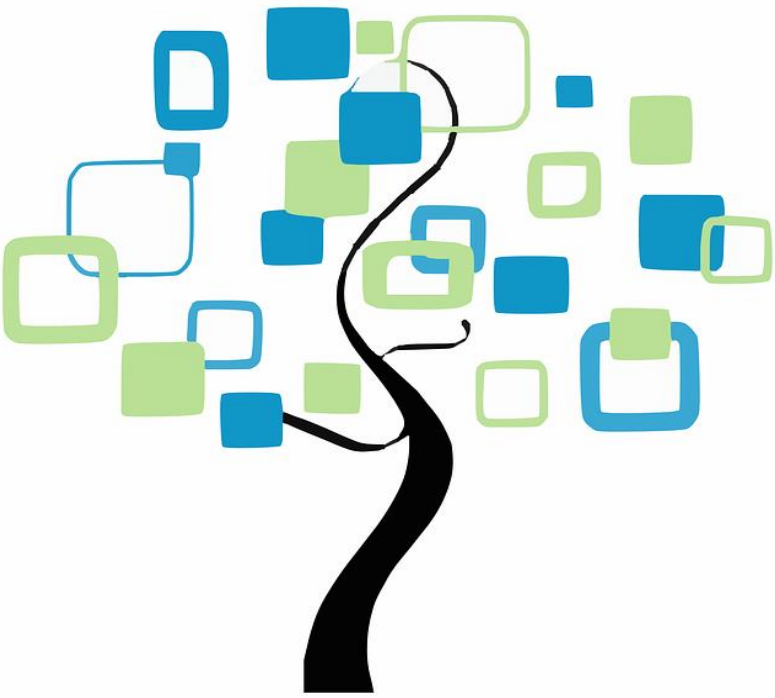
Designing powerful learning incorporates **the design of authentic, rigorous units of study, the implementation of strategic learning, as well as a focus on student engagement, and citizenship.** It is the integration of all of these elements that supports deep understanding of curricular objects and enables students to acquire a disposition for all learning, now and in their future.

Implementation of Powerful Learning

GHSD is currently focused on the implementation of Powerful Learning throughout all schools. Implementation includes development of “Assessment for Learning” strategies, intentional integration of Critical Thinking challenges and a clear understanding of the characteristics of powerful learning tasks including those outlined through the Galileo Network. The core competencies and the GHSD Literacy and Numeracy Frameworks are integrated in the planning of well-designed learning experiences.

Areas of strategic instruction are also outlined in this document as well as within the GHSD Literacy and Numeracy Frameworks. These Frameworks describe the key assumptions and beliefs that form the foundation of literacy and numeracy learning in GHSD. Key resources and strategies are also outlined in these frameworks to encourage common practice throughout the district.

It is recognized that this is a starting point and that GHSD will continue to incorporate relevant research including such areas as learning theory/brain research and research on high impact strategies. Since the inception of AISI, research has guided the implementation of best practices in our classrooms and it will continue to do so.



Characteristics of Powerful Learning

In order to ensure the development of deep understanding of curriculum essentials learning opportunities incorporate a number of key characteristics of powerful learning. These characteristics are foundational to the planning of lessons and units in GHSD.

Fostering Critical Thinking

GHSD has recognized the importance of infusing critical thinking into our classrooms and has partnered up with the Critical Thinking Consortia (TC2) including Garfield Gini-Newman and key facilitators. The TC2 team has worked with GHSD teachers to understand the tweaks they can make to lessons in order to intentionally develop critical thinking. Students are invited to think critically or reason using a set of criteria. When students are offered a critical challenge and encouraged to engage in critical inquiry, increased engagement and deeper learning can be achieved. Garfield encourages "teachers to activate learning about a topic by involving students in shaping questions to guide their study, giving them ownership over the direction of these investigations and requiring that students critically analyze and not merely retrieve information." (Gini-Newman & Gini-Newman, p. 35). In this way, according to Garfield, a shift occurs from covering curriculum to students uncovering the curriculum". The content of the curriculum is "problematized" which then leads to an investigation and discovery connected to the real world. Through this type of investigation students draw conclusions, make decisions and solve problems. This emphasis is consistent with Inspiring Education. **Critical thinking** is one of the core competencies identified by Alberta Learning. In order to foster critical thinking and problem solving, GHSD teachers are encouraged to reflect on their own inquiry and investigative processes and thereby learn how they as teachers observe, think, and question their students (Galileo Network).

Encouraging Creativity and Innovation

Designing powerful learning incorporates opportunities for students to develop creativity in their classrooms. **Creativity** is a core competency defined by Alberta Learning as the ability to apply creative thought processes to create something of value. Moving away from scripted lessons to asking questions that encourage critical and creative thinking helps our students to think in both divergent and convergent ways, analyzing and evaluating as they learn. Drapeau states that both divergent and convergent thinking are necessary for creativity. (Drapeau, 2014) "A student uses divergent thinking to generate different solutions to a problem or challenge and then uses convergent thinking to decide which one will provide the best results". (Drapeau, 2104) "The creative process includes elaborating on the initial ideas, testing, and refining them and even rejecting them." (Drapeau, 2011, As cited in Drapeau, 2014, p 2) As well, innovation is encouraged in

GHSD. **Innovation** as one of the core competencies is defined by Alberta Learning as the capacity to create and apply new knowledge to create new products or solve complex problems.

Engaging in Sustained Inquiry

Through powerful questions and learning tasks, GHSD teachers ignite inquiry in a sustained manner and "hook" student interest and motivation to learn. Sustained inquiry engages students in bigger questions that do not have immediate answers, questions that lead to more enduring investigations. It also develops habits of critical and creative thinking in all areas of learning.

Learning in the World:

Fostering Authenticity and Real World Connections

The importance of designing authentic tasks and inquiries guides the design of powerful learning in GHSD. Task design considers what is meaningful and relevant for the students. Authentic tasks are defined by Galileo are "tasks and inquiries that have personal meaning to students, reflect real life work, has students create and contribute to the world's knowledge and demands a variety of roles and perspectives".

When learning moves beyond the classroom, students are engaged in being able to "observe, interact, collaborate and create with experts" (Galileo) in the community. "Inquiries and tasks are developed that require student collaboration to acquire and use competencies expected from high performance work environments: teamwork, problem posing, problem solving, communication, decision making and project management." (Galileo). In the design of learning, every attempt is made by teachers to consider what the discipline calls for (i.e. in mathematics we consider how to help students to learn how to think like a mathematician). GHSD teachers also make every attempt to provide students with "worthwhile work". In order to foster authenticity and real world connections there is a deliberate development of the competency of collaboration and communication (two core competencies as identified through Alberta Learning. Alberta Learning describes **collaboration** as ability to interact positively and respectfully with others in creating new ideas and developing products. **Communication** is defined by Alberta Learning as the ability to use technology to develop competencies and ability to critically interpret and evaluate ideas, the ability to access, analyze, integrate and manage large volumes of information. Communication includes the dialogue between teachers as they examine their own practice and examine current literature (as defined by Galileo Network).

Learning Through Assessment: Assessment for Learning (AFL)

GHSD has focused on improving student learning through developing teacher practice in attending to ongoing "minute-by-minute and day-to-day formative assessment" (Wiliam, 2011, p. 27). Formative assessment "encompasses all those activities undertaken by teachers and /or students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged" as cited in Wiliam, 2011. Wiliam states "An assessment functions formatively to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about the next steps in instruction…" (Wiliam 2011, p. 43). In order for teacher and learners to determine next steps, it is imperative that teachers determine "where students are at in their learning, where they are going and how to get there". The AFL strategies implemented in GHSD help teachers to plan with clear goals linked to curriculum, as well as understand how to provide extensive descriptive feedback during the learning. Hattie (2009) identified in his research (meta-analysis of 800 research studies) that "feedback" is ranked as having a high impact on learning, which is consistent with teacher observations in GHSD.

GHSD achievement results have improved by integrating effective assessment for learning practices. GHSD positive results as supported by a large body of research that shows the positive impact of Formative assessment upon improving student learning.
GHSD has identified the following key components of "Assessment for Learning" to be implemented during the instructional process to improve teaching and learning.

Technology Enhanced Learning Environments

Technology is integrated into the learning environment as the tool to gather information, construct new learning, document learning and extend learning to creations and innovations. Technology is used to facilitate the creation and communication of learning with others. Galileo Learning Network identifies characteristics of strong Inquiries and tasks that permit students to select appropriate technologies to create, contribute, connect and collaborate with others. GHSD supports the role of technology as outlined in Inspiring Education "Ultimately, the power of technology should be harnessed to support innovation and discovery, not simply to aid teaching. We need to engage learners to use these technologies as designers and creators of knowledge".

Strategic Instruction

Strategic instruction is a powerful student-centered approach that implements high-impact, research-based teaching strategies in order to improve student achievement. These strategies help students to efficiently grasp core curricular competencies, as well as organize, analyze and manage information. Strategic instruction enables students to effectively gain foundational skills, in order to become innovative thinkers, creators and doers. Research supports the use of high impact strategies to increase student achievement. GHSD has identified a number of high-impact strategies that are encouraged in all classrooms.

Teaching is a highly complex activity. Learning theory and brain research has increased the efficacy of teaching. This research continues to illuminate the most effective ways to support deeper learning and understanding. As new research emerges, it will continue to inform future practice. The following strategies are known to demonstrate a high impact on learning.

Assessment for Learning:

Formative assessment can be seen as an on-going process that relies on several measures over time. It is viewed as a process rather than a singular event (Bennett, 2011). Formative assessments use information from the judgment of student work and performance to improve student achievement (Sadler, 1989). Students are provided with feedback as to how successfully a task has been completed or is being completed. They use this feedback to improve upon their achievement. Information collected through the use of formative assessment is used to further student learning (Ayala, 2005). Teachers create instruction based on evidence gathered through formative uses of assessment. These formative interactions are designed to encourage thought on the student's part (Black & William, 2009). Teachers use information from these interactions in order to make decisions surrounding the curriculum and the direction of learning. They determine whether to move forward, how to move forward and where to encourage student focus. This view focuses on the process of developing and changing instruction to match student needs.

Overview / Implementation

Curriculum Essentials	• Prioritized curriculum • Planning with the end in mind (Enduring Understandings) • Specific and student friendly learning targets/sharing outcomes with students • Assessing to the outcomes

Effective Questioning	See **'Effective Questioning'** section below
Effective Feedback	See 'Effective Feedback' section below
Exemplars	• Provides models of tasks at varying levels of achievement • Allows students to see where they are at in relation to the learning goal
Rubrics	• Communicates success criteria • Co-creating rubrics in student friendly language
Student Goal Setting	• Specific, Measurable, Achievable, Realistic, Time Framed • Making adjustments and monitoring to reach goal
Peer and Self-Assessment/ Feedback	• Students use rubrics, checklist and guides to focus self- reflections • Teachers model and teach the tools of how to self and peer assess
Triangulation of Data	• Data is gathered and provides evidence of where the student is at in relation to the learning outcome. This might be in the form of a product, conversation or observation. • Teachers and students gather evidence to inform student learning through a variety of sources. • Teachers adjust their teaching in the moment to further student understanding and address misunderstandings.
Additional Resources	For additional formative assessment strategies and descriptions go to: Tools for Formative Assessment - Techniques to Check for Understanding - Processing Activities – http://www.levy.k12.fl.us/instruction/Instructional_Tools/60FormativeAssessment.pdf Dodge, J. (2009). *25 Quick Formative Assessments for a Differentiated Classroom*. New York: Scholastic Inc. Moss, C. & Brookhart, S. (2009). *Advancing Formative Assessment in Every Classroom-A Guide for Instructional Leaders*. Alexandria: ASCD. William, D. (2011). *Embedded Formative Assessment*. Bloomington: Solution Tree.

Effective Feedback (AFL):

Timely and concise feedback provides students with information about what they know or don't know and is used, by teachers, to direct further instruction. Teachers can use this feedback to help students bridge the gap between what they know and what they need to know (Ayala, 2005). As students use feedback, they become capable of building upon their own learning and develop enhanced metacognition and increased motivation (Brookhart, 2012). "When teachers seek, or at least open to, feedback from students as to what students know, what they understand, where they make errors, when they have misconceptions, when they are not engaged-then teaching and learning can be synchronized and powerful. Feedback to teachers helps make learning visible" (Visible Learning, 2009, p.173). The most effective feedback provides information to students about their tasks and how to do it more effectively (Hattie & Timberley, 2007).

Strategy	Overview / Implementation
Effective Feedback that Moves Learning Forward	● Teachers give feedback that is focused, specific and descriptive. ● Feedback is timely and limited in the amount of feedback at one time. ● Facilitates the development of self-assessment ● Includes affirmations, noticing and naming good qualities in a student's work that enables the student to adjust what they are doing to improve learning by understanding specific next- steps.

Critical Thinking:

Critical thinking engages students in exploring provocative questions or challenges and encourages students to investigate, reflect, create and share their understandings. When someone is thinking critically they are assessing or judging the merits of potential options based on a set of relevant criteria.

In order to foster critical thinking, students need opportunities to build upon their prior knowledge, communicate with peers, develop knowledge and skills to analyze information and draw their own conclusions in an engaged classroom.

	Overview / Implementation
Developing Intellectual Tools	○ **Background Knowledge-** relevant background knowledge and information about a topic that is required for thoughtful reflection. It is the "content" that we need to be able to think critically. ○ **Criteria for Judgment-** appropriate criteria used for judging the merit and reasonableness of the choices in a thinking challenge ○ **Critical Thinking Vocabulary-** refers to concepts that address distinctions

	underlying being able to think critically such as conclusion, correlation, justify, relevant, evidence and proof ○ **Thinking Strategies-** the knowledge and use of appropriate procedures and processes when thinking through a challenge. There are many strategies that can guide students through challenges that they encounter ○ **Habits of Mind-** values and attitudes or dispositions of a careful and conscientious thinker such as persistence, open mindedness, fair mindedness and tolerance to ambiguity (Case, 2005)
Effective Questioning	See '**Effective Questioning**' section below

Effective Questioning:

Questioning has been found to be the second most dominant teaching method after teacher talk, with teachers spending 35-50% of teaching time posing questions (Hattie, 2009, p. 182). Questioning is a powerful strategy for teaching concepts, building comprehension and helping students to assume an inquiry stance towards learn. Asking questions to foster an inquisitive stance helps students to be open to new ideas. Most questions that teachers ask are questions they already know the answer to (guess what is in the teachers head types of questions) as cited in (Hattie, 2009. p. 182). The importance of questions that will propel learning and build curiosity are highlighted in Ritchhart et.al's work (2011). A balance of the types of questions and the use of questions that will foster inquiry and critical thinking are encouraged in the implementation of Powerful Learning.

Overview / Implementation

Key Ideas	● Teachers plan the questions they ask to help students focus on the most important concepts and the criteria for success. ● Teachers use powerful questions…ones that give you lots of information, are specific to the person or situation, are open-ended and usually not easy to answer ● Teachers use provocative questions to prompt student reflection on their understanding. ● Teachers ask questions that encourage students to reflect upon peers' ideas and to respond to them. ● Teachers use appropriate wait time before getting student responses ● Teachers use a variety of ways to gather student responses (e.g., pulling names from a jar, students write down their responses, etc.)

Levels of Questions	**Address all three levels of questions:** 1) Gather - collecting information, fact finding, recall 2) Process - comparing, analyzing 3) Apply - evaluate, judge, application **Constructive Questioning**: (Ritchhart, Church & Morrison, 2011) • defined as questions that help to advance understanding. "These are questions that ask students to connect ideas, to make interpretations, to focus on big ideas and central concepts, to extend ideas and so on" (Ritchhart et.al, 2011, p. 33). • questions are asked to guide, direct and push forward student's understanding of important ideas **What are good questions?** ● help students make sense of concepts and deepen understanding ● open-ended ● empower students to unravel misconceptions ● require students to make connections and generalizations ● accessible to all students and will offer multiple entry points ● leads students to "wonder" **How are good questions created?** ● consider the goal of the lesson ● consider misconceptions ● consider the connections you want to make between the lesson goals and other concepts ● consider assessment **What are teacher's responsibilities?** ● model inquisitiveness allowing students to see teachers as open to new ideas, being persistent in searching for answers and demonstrating the ability to listen and collaborate. ● understand the learning embedded in the question ● present it clearly ● set clear and reasonable expectations for the work ● allow for individual approaches, methods or answers ● add variety or more data to be accessible for all ● use concrete materials ● allow time ● create a safe environment with routines and procedures in place ● practice wait time ● discuss answers focusing on student thinking
Making Thinking Visible:	

"Making Thinking Visible" as outlined by Ron Ritchhart, Mark Church and Karin Morrison (2011) strives to help students achieve deeper understanding through the use of thinking routines and effective questioning. To think or understand "deeply" means "there is a focus on developing understanding through more active and constructive processes" (Ritchhart et al. 2011, p. 7). When students develop a greater awareness of "how they think", they become independent learners capable of directing and managing their own thinking and learning. Ritchhart states that thinking routines act as tools for promoting thinking, as well as provide structures and patterns for thinking. GHSD teachers strive to build student understanding by making thinking visible in their classrooms. Routines for introducing learning, synthesizing and organizing ideas and digging deeper into ideas are outlined.

Overview / Implementation

Thinking Moves	Ritchhart et.al describes key thinking moves that are involved in different kinds of thinking in order to understand. These include: • observing closely and describing what is there • building explanations and interpretations • reasoning with evidence • making connections • considering different viewpoints and perspectives • wondering and asking questions • uncovering complexity and going below the surface of things
Ways to make the thinking visible	Ritchhart et al. (2011) has identified three ways to make thinking more visible. "Through questions, teachers can model their interest in the ideas being explored; help students to construct understand and facilitate the illumination of students' own thinking to themselves". (Ritchhart, Church & Morrison, 2011, p. 31)
Thinking Routines	Three clusters of thinking routines make thinking visible according to Ritchhart et al. (2011). Ritchhart defines thinking routines as any procedure, process or pattern of action this is used repeatedly to manage and facilitate the accomplishment of specific goals or task. Routines for **Introducing and Exploring Ideas** (i.e. See-Think-Wonder, Chalk Talk) Routines for **Synthesizing and Organizing Ideas** (i.e. Headlines, CSI: Color, Symbol, Image) Routines for **Digging Deeper into Ideas** (i.e. What Makes you Say That, Step Inside)

Intentional/Explicit teaching of Academic Vocabulary:

Marzano and Pickering (2005) reported that when students have general knowledge of the terms that are important to content taught in school, achievement is significantly improved. One of the most crucial advantages that teachers can provide, particularly for students who do not come from academically advantaged backgrounds, is systematic instruction in important academic terms.

Strategy	Overview / Implementation
Academic Vocabulary	Explicitly teaching academic vocabulary involves 6 basic steps. Attending to all steps ensures best results. Step 1. Introduction: Provide a description, explanation and or examples of the new term. Step 2. Restate: Students explain or describe the term in their own words. An academic notebook is suggested to keep track of the terms. Step 3. Draw & Self Assess: Students draw a picture, symbol or graphic to represent the meaning of the term. Students self-assess their level of understanding of the term. Step 4. Activities: Provide activities to engage students as they work to remember the terms. Ex: antonyms/synonyms, compare/contrast, morphology. Step 5: Talk: Discussing the terms with a peer allows for misunderstandings to present themselves and knowledge to deepen. Step 6: Games: An engaging way to learn the terms. Frequent use of the terms helps transfer the terms into long memory.

Cues and Organizers:

The use of cues and organizers provide students with a conceptual framework to hook new learning on to and they enhance student's ability to retrieve, use and organize what they already know about a topic. The use of a variety of graphic organizers throughout the learning provides opportunities for students to extend and apply knowledge. Advance organizers are stories, pictures and other introductory materials or tasks that set the stage for learning (Dean, Hubbell, Pitler & Stone, 2012). Post organizers are tasks completed at the end of learning that summarizes or captures the key ideas.

Overview / Implementation	
Graphic Organizers	Advanced and post organizers, Concept Mapping, Web, Venn Diagram, Timeline, RAN/KWL, Story Map.

Nonlinguistic Representations:

Nonlinguistic representations have been found to provide students with useful tools that merge knowledge presented in the classroom with ways of understanding and remembering knowledge (Jewitt, 2008). Nonlinguistic representation strategies are ones which help students represent understanding and elaborate on that knowledge using mental images or imagery. Nonlinguistic representations involve imagery, creating pictures and engaging in kinesthetic activity. Research has found this to be a powerful strategy because it taps into a student's natural tendency for visual image processing. This strategy helps students to construct meaning of relevant content and skills and have a better capacity to recall it later (Medina, 2008). Studies in Beesley and Apthorp's, 2010, analysis indicated that the impact of using nonlinguistic representations can multiply when teachers and students use the strategy in combinations with other strategies.

Strategy	Overview / Implementation
Physical Models	Hands on tasks to create concrete representations of knowledge.
Mental Imagery	Students are asked to create a mental picture of the information to help them make sense of what they are learning to and to help store it in long term memory. Incorporate sounds, smells, tastes and visual details as part of the overall mental picture.
Creating Pictures	Students draw or color pictures that represent knowledge. Using pictures helps students to represent their learning in personalized ways. "Draw what it means to you."
Kinesthetic Activity	Students engage in physical movement associated with specific knowledge to generate understanding of content/skills. When students move they create more neural networks in the brain and learning is enhanced. Examples: ● Role Play ● Acting out vocabulary words ● Using your body or hand movements to illustrate concepts ● Card sorts (First Steps) ● Use bodies to demonstrate understanding of motions of objects (ie. planets orbiting the sun). As students make the motions and talk about what they are doing, they encode information in their memory in multiple ways and help to increase understanding.

Identify Similarities and Differences:

The set of instructional strategies that cluster around identifying similarities and differences involve students in comparisons, classifications, metaphors and analogies. These strategies help students move from existing knowledge to new knowledge, concrete to abstract and separate to connected ideas. Twelve studies were reviewed in a meta-analysis, 2010, conducted by McREL researchers. The effect size of these strategies was .66 which is equivalent to a 25 percentile point gain (Dean, Hubbell, Pitler & Stone, 2012). This indicates that students benefit from the explicit instruction in processes which use similarities and differences.

Strategy	Overview / Implementation
Comparing	Venn Diagram
Classifying	The process of organizing things into groups and labeling them according to their similarities.
Metaphors	The process of identifying a general or basic pattern in a specific topic and then finding another topic that appears to be quite different but has the same general pattern. It provides an anchor for new abstract learning through the intentional teaching of metaphors to focus on how items are similar on an abstract level.
Analogies	The process of identifying relationships between pairs of concepts and pairs of relationships. It guides us to see relationships between things that seem dissimilar on the surface. ex) A is to B as C is to D. 1. Identify how the two items in the first pair are related 2. State the relationship in a general way 3. Identify another pair of items that share a similar relationship Resource: Page 90 The Highly Engaged Classroom Resource: The Sourcebook for Teaching Science provides an online guide for how to teach science through the use of analogies. http://www.csun.edu/~vceed002/ref/analogy/analogy.htm

Generating and Testing Hypotheses:

Generating and testing hypotheses deepens student knowledge because it requires the use of critical thinking skills when analyzing and evaluating. Problem solving, experimental inquiry and investigation are incorporated to generate and test a hypothesis. Generating and testing hypotheses applies knowledge through the use of two thinking processes. One of these processes is deduction which involves using general rules to make a prediction about a future event or action. Induction is the second thinking process, which involves making inferences based upon knowledge that the student already has. This involves drawing new conclusions or identifying rules based upon observations. This strategy enhances students understanding of and ability to use knowledge by engaging them in the mental process required for making and testing hypothesis.

Strategy	Overview / Implementation
Generating and Testing Hypotheses	Hypothesizing includes predicting, inferring, deducting and theorizing. By engaging them in mental processes that involve making and testing hypotheses, students' understanding and ability to use knowledge is enhanced. This moves them beyond "right answer learning." Classroom Practices: 1. Engage students in a variety of structured tasks for generating and testing hypothesis. These tasks include: ● Systems Analysis: Analyzing parts of a system and the manner in which they interact. ● Problem solving: Problem solving involves overcoming constraints or limiting conditions that are in the way of achieving goals. ● Experimental inquiry: The process of generating and testing explanations of observations. ● Investigation: The process of identifying and resolving issues regarding past events about which there are confusions or contradictions. 2. Ask students to explain their hypotheses and their conclusions helps students deepen their understanding of the principles they are applying.

Summarizing and Note-Taking:

Summarizing and note-taking are essential elements of learning. Summarizing is the process of distilling information down into its most essential points to increase understanding, memorizing, and learning what is relevant. Note-taking is the process of capturing key ideas through writing, drawing, etc. These are essential strategies because they involve higher-order thinking skills. Note-taking strategies are not intuitive which means that students benefit from explicit instruction in note-taking, particularly those that are guided by the teacher and are structured.

Strategy	Overview / Implementation
Summarizing and Note-Taking	**SUMMARIZING STRATEGIES** **Rule based summarizing strategy** ● take out material that is not important to understanding ● take out words that repeat information ● replace a list of things with one word that describes them ● find a topic sentence or create one **Use summary frames** ● a series of questions designed to highlight the critical elements of a specific text pattern ● six frames ○ narrative ○ topic-restriction-illustration ○ definition ○ argumentation ○ problem-solution ○ conversation **Teach student reciprocal teaching** ● for expository text ● four roles ○ summarizer ○ questioner ○ clarifier ○ predictor **Note-Taking:** Give students teacher prepared notes ● show the organizational structure, model Teach a variety of note-taking formats ● webs, words, pictures, computer generated notes, outlines

	Provide opportunities for students to revise their notes and use them for review ● leave spaces in notes for revisions as learning takes place ● provide feedback during review to allow for growth in the skill development ● narrow the margins (allows room for additions or corrections)

Metacognition:

Research shows that metacognition can be taught in order to help students improve their own learning. The awareness and understanding of one's own thought processes- Thinking About Thinking.

Strategy	Overview / Implementation
Metacognition	Fitting Metacognition into Classroom Instruction: • Explicitly teach students what metacognition means. • Share the goals of learning activities in advance, and guide students to plan strategies and monitor their progress toward achieving those goals. • Model your own use of metacognition by thinking out loud. When reading aloud, make-and correct-mistakes and show how you use context to establish the meaning of unfamiliar words. Predict what might happen in a science experiment. Talk through the steps of solving a math problem. • Add steps to encourage self-reflection, goal-setting and self-assessment into lessons and learning. [1] • Plan–Do–Review: A metacognitive approach to problem solving involves three main steps: (1) identify possible solutions and plan how to implement the most likely one, (2) implement the solution, and (3) assess its effectiveness and make adjustments if necessary. [2] [1] Lovett, M. C. (2008). Teaching metacognition [PowerPoint presentation]. Retrieved fromhttp://net.educause.edu/upload/presentations/ELI081/FS03/Metacognition-ELI.pdf [2]http://www.ascd.org/publications/educational-leadership/oct14/vol72/num02/%C2%A3The-Boss-of-My-Brain%C2%A3.aspx

Teaching Approaches:	
Strategy	**Overview / Implementation**
Direct Instruction	Direct instruction involves the following components: • teacher specifies learning outcomes • teacher knows and communicates success criteria • builds commitment and engagement in learning task (the hook) • lesson design includes-consideration of background knowledge, modeling, & check for understanding • guided practice • lesson closure • independent practice
Reciprocal Teaching	Palincsar (1986) describes the concept of reciprocal teaching: Reciprocal teaching refers to an instructional activity that takes place in the form of a dialogue between teachers and students regarding segments of text. The dialogue is structured by the use of four strategies: summarizing, question generating, clarifying, and predicting. The teacher and students take turns assuming the role of teacher in leading this dialogue. Reciprocal teaching involves the following components: • students take turns being the teacher • teacher and students take turns leading the dialogue
Problem-Solving Teaching	Problem-solving teaching involves the following components: • defining or determining the cause of the problem • identifying, prioritizing and selecting alternatives for a solution • using multiple perspectives to uncover the issue related to a particular problem • designing an intervention plan • evaluating the outcome

Student Engagement

Student engagement has long been at the core of effective schooling. The type of engagement that is being fostered in GHSD is “Intellectual Engagement”. Engagement is thought of as motivation, attention, interest, effort, enthusiasm, participation and involvement. According to Marzano et. al (2011) four topics that constitute the model of attention and engagement are: emotions, interest, perceived importance and perceptions of efficacy. Student engagement involves providing students with opportunities to experience interactive learning/cooperative learning in a supportive environment. “Engagement” is understood in GHSD as a focus on framing learning using relevant and powerful questions, meaningful challenges and authentic applications that extend beyond the classroom and when possible have global connections.

Ways to engage students:

- **Posing guiding inquiry questions**- According to Jeffrey Wilhelm in his book, Engaging Readers & Writers with Inquiry, guiding questions create a clear focus that connects students to socially significant material and learning. This leads to exciting conversations that bring together the students’ lives, the course content, and the world in which they live as they consolidate concepts, vocabulary strategies and ideas.
- **Attending to students’ feelings**- Marzano states that if students are low on energy or feeling bored, frustrated, or rejected by the teacher or their peers, it is likely that they are not attending to classroom activities. If a teacher does not have a student's attention, there is little hope that the content being addressed will enter his or her working or permanent memory. Teachers can effectively use pacing and incorporating physical movement into lessons to help students feel energized; they can also demonstrate intensity and enthusiasm and use humor to help students feel stimulated. Establishing personal relationships and fostering positive peer relationships in a fair and supportive classroom atmosphere can also be effective.
- **Use games and inconsequential competition-** Help maintain situational interest. Games should always have an academic focus. They provide opportunities to test understanding through friendly competition. For exercises, check out: marzanoreseach.com/classroom strategies
- **Initiate friendly controversy-** Controversy can trigger and maintain situational interest, especially when opposing views are expressed. Controversy should not be avoided. Friendly controversy should leave the students with some unanswered questions so they seek more information. Class votes on issues, a debate, a town hall meeting - which has students looking at various perspectives - the legal model

and perspective analysis are opportunities to initiate friendly controversies around curriculum to create interest.

- **Present unusual information**- Creates a sense of curiosity and invites students to engage by filling in bits of information that may be missing.
- **Vary questioning-** Asking questions excites a student's working memory, thus eliciting students' attention. To avoid other students from disengaging, several techniques are considered effective: call on students randomly, paired response, wait time, response chaining, choral response and simultaneous individual responses.
- **Connecting to students' lives**- Comparison tasks where students relate new knowledge to topics of personal interest. Analogy problems are effective ways to connect to students lives.
- **Conducting purposeful research-** When students are able to use what they have learned to effect change in their communities directly, they are much more likely to feel the work is important, thus connected to engagement.
- **Thinking critically-** Cognitively complex tests that are perceived as important are engaging for students.
- **Provide choice-** Building choice into activities helps students perceive classroom activities as important. Choice can be provided through allowing students to choose tasks, choice of reporting formats, choice of learning goals and choice of behaviors.
- **Real world application-** Provides students with a sense that what they are doing in school is important. This is by providing tasks that provide a goal that extends beyond the classroom.
- **Drawing conclusions supported with evidence**
- **Involving students in planning**
- **Involving students in monitoring-** Develops self-efficacy as students chart their progress, on a specific learning goal, over time.
- **Using effective feedback**- Praising effort and aspects of a task are highly motivational and steer students toward the intended result.
- **Teaching self-efficacy-** Students should be directly involved in discussing self-efficacy and studying it first hand through correlating effort and preparation with achievement.
- **Involving students in self-reflection**
- **Involving students in peer-reflection**
- **Involving students in progress and results-** Tracking can reinforce efficacy and help students feel that they can do the required work. This requires a great deal of planning and preparation by the teacher.

Citizenship

The need to help students develop the skills for citizenship and social responsibility has become increasingly evident in our classrooms. “In addition to producing students who are culturally literate, intellectually reflective, and committed to lifelong learning, high quality education should teach young people to interact in socially skilled and respectful ways; to practice positive, safe and healthy behaviors; to contribute ethically and responsibly to their peer group, family, school and community: and to possess basic competencies, work habits and values as a foundation for meaningful employment and engaged citizenship (as cited in Greenberg et al, 2003). In other words, students also need to learn how to demonstrate social, emotional and behavioral regulation. Helping students gain skills in conscious regulation of their own actions, leads to increased control and problem solving abilities. The development of self-regulation provides the foundation for higher metacognitive functioning, which enables students to respond to complex challenges.

In order to foster innovative thinkers, doers and connectors, students in Golden Hills School Division (GHSD) strive to acquire the skills and attributes necessary to be successful in a globally connected world. It has become increasingly important that GHSD promote active involvement with diverse communities and real-world challenges.
With this in mind, it is clear that learning experiences need to continue to move beyond the delivery and memorization of knowledge and skills. Instead, learning experiences need to foster deeper thinking which will enable students to think about and understand related concepts, solve problems and apply learning across settings and through time. It is more important to know how to access information and be a self-motivated learner than it is to memorize content and procedures. It has also become increasingly clear that we need to teach students how to effectively collaborate with one another in order to become innovators and generators of new knowledge facilitated through the meaningful integration of technology. In order to be effective in collaboration, it begins with a foundation of social and emotional competencies. CASEL 2008 identifies five core competencies in social and emotional learning: self-awareness, self-management, social awareness, relationship skills, and responsible decision making.

- Self-awareness is defined as the ability to accurately recognize one’s emotions and thoughts and their influences on behavior. This includes accurately assessing one’s strengths and limitations and possessing a well-grounded sense of confidence and optimism.

- Self-management is defined as the ability to regulate ones' emotions, thoughts and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.
- Social awareness is defined as the ability to take the perspective of and empathize with others from diverse background and cultures, to understand social and ethical norms for behavior, and to recognize family, school and community resources and supports.
- Relationship skills are the ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively and seeking and offering help when needed.
- Responsible decision-making is defined as the ability to make responsible and constructive choices about personal behavior and social interaction based on consideration of ethical standards, safely concerns, social norms, the realistic evaluation of the consequences of various actions and the well-being of self and others.

Through an increased focus on citizenship and global connectedness we recognize that, as Daniel Pink indicates, students will "…need to be able to design innovations, communicate through compelling stories, develop rapport with others and synthesize seemingly disconnected pieces of information in new way" (as cited by Dean, Hubbell, Pitler, & Stone, 2012).

Our learning experiences in our classrooms in GHSD need to foster creative, critical and reflective thinking rooted in strong social-emotional learning for today and for tomorrow.

Implications: Need for Explicit Instruction

Skills of Self-Regulation

Self-regulation is the ability for a student to adjust their level of alertness and how they display their emotions through their behavior to attain goals in socially adaptive ways (Bronson, 2001). The need for the intentional integration of instruction in self-regulation has become evident.

Skills of Collaboration
Effective communication includes teaming, collaboration and interpersonal skills, personal, social and civic responsibility, and interactive communication. We naturally assume that students know these skills. **Collaborative skills include listening, reasoning together and building upon each other's ideas**.

Perspective Taking Skills & Ways to Handle Conflict
Students benefit from learning to show empathy. Roots of Empathy can be used to teach communication and specific skills for perspective taking and handling conflict.

Problem Solving Strategies
Problem solving strategies such as anti-bullying, online behaviors and digital citizenship where clear policies have been designed are important for students to be socially responsible.

Develop Cultural Understanding and Global Awareness
Develop cultural understanding and global awareness by engaging with learners from other cultures. Help students show understanding of human, cultural, and societal issues related to technology and practice legal and ethical behavior through digital citizenship.

Constructive Controversies
Incorporate constructive controversies into instruction which can result in students inventing more creative solutions to problems, becoming more original in their thinking, generating and utilizing more ideas and analyzing problems at a deeper level.

Summary: Due to the vast and rapidly growing amount of information and knowledge in our world, it is important that learning tasks move to higher levels of abstraction such as concepts and principles, and that learning tasks organize that knowledge and help students to see patterns and connections between factual knowledge and transferable constructs (Pickering, 2010). Technological advances, globalization and the increased complexity of our world necessitates that GHSD teachers shift traditional instruction and design learning experiences to meet the needs of our digitally competent students in order to prepare them for a rapidly changing world.

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APPENDIX A

Literacy Framework

GHSD LITERACY FRAMEWORK (K-12)

Revised December 2014

GHSD LITERACY FRAMEWORK (K-12)

Revised December 2014

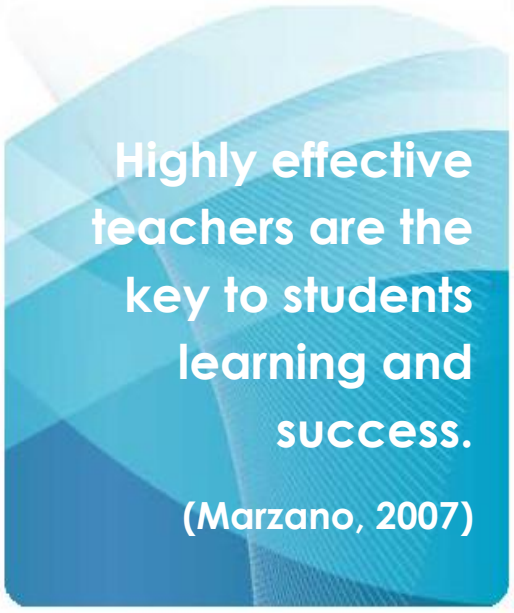
GHSD believes that continuous school improvement and student success depends upon the quality of instruction in classrooms. A common literacy framework supports identification of best literacy practices and effective high impact instruction for all students.

The intent of this framework is to strengthen instructional practice ultimately enhancing learning and achievement for all students.

Why is this framework being developed?

To have in depth conversations about instructional practices, teachers need a common language. In addition to common language, all parties involved need to articulate a framework that defines and identifies key components regarding effective classroom instruction and practice around literacy beliefs and instruction.

Research indicates that initiatives are **most effective with a division wide focus and implementation**. A small number of clearly defined goals tied to student achievement which are relentlessly pursued can be expected to result in the greatest gains.



"....the most significant in-school factor affecting student achievement is the quality of teaching" ***(Hargreaves and Fullan, 2012)***

The **purpose of this framework** is to define literacy, inform educators about key literacy initiatives and strategies and create a common understanding of assessment in literacy

(Adapted from Chinooks Edge QLE, 2014)

The framework will:

- Acknowledge the quality work already being done by teachers in their classrooms while challenging teachers to continually grow in our instructional efforts to improve learning for all students.

- Guide the work of all instructional leaders in supporting teacher growth and development

- Create a shared understanding about quality teaching and learning

- Align and refine the focus for current and future initiatives.

- Obtain commitment of all teachers and administrators to use this framework to engage in conversations and practices that lead to continuous improvements in teaching and learning.

The framework is not:

- **A fad**
- **An evaluation tool**

Literacy Framework Beliefs and Assumptions:

Literacy is the ability to understand, respond to and use language to share information and interact with others. It involves the lifelong intellectual process of gaining meaning from text.

Literacy is viewed as the lifelong intellectual process of gaining meaning from text.

GHSD acknowledges that literacy is defined as more than reading and writing and has expanded to include multimodal, digitally rich contexts where students have "anytime, anywhere" access to information. The 21st Century demands that a literate person possess a wide range of abilities and competencies. This necessitates that students in GHSD be explicitly taught strategies to navigate all forms of literacy such as visual literacy, digital literacy and media literacy. For our students to be well prepared for their future they need to be able to process a wide variety of sources of information critically and with confidence and be equipped with the tools and support they need to be successful, innovative thinkers. In addition, our students need to be able to use information and insights from text as the basis for informed decisions and creative thought within a global environment.

GHSD recognizes the devastating impact of failure to acquire literacy skills and the high correlation between high school dropout rates and low literacy levels. Poor acquisition of literacy skills is a barrier in all aspects of schooling. It is with this in mind that GHSD has developed an action plan to continue to ensure maximum literacy growth for all students.

"Literacy is at the heart of sustainable development...Acquiring literacy in an empowering process, enabling millions to enjoy access to knowledge and information which broadens horizons, increases opportunities and creates alternatives for building a better life" (Kofi Annan, 2001 Nobel Peace Prize Winner)

Guiding Principles:

- To effectively learn literacy skills, students need direct and explicit instruction in how to use literacy strategies to extract information and apply and share what they have learned. Students need these strategies to be able to create and comprehend texts from a variety of media in a range of contexts.
- Explicit instruction is important in all forms of literacy such as teaching students how to critically interpret and analyze visual images using criteria.
- Learning across the content areas helps students to acquire and apply literacy strategies to construct knowledge and assume ownership of learning. Our goal is to help students acquire high impact strategies and to help students become independent learners.
- Students benefit from being aware of, and able to apply, monitor and adjust strategies through teacher modelling, guiding and practice opportunities across the different curriculum contexts.
- Students need to understand the process or strategy that they are using and how that process or strategy helps them learn in order for them transfer and to know how to apply these skills in the future.
- Reading and writing are reciprocal and interconnected and therefore explicit instruction about these interconnections will be important
- Reading is more than being able to read the words with fluency.
- Explicit instruction in vocabulary and use to text features is beneficial.
- Reading is an active, integrated problem-solving process of making sense of texts.
- Effective readers comprehend text by drawing on multiple sources of information and cueing systems. Cueing systems are drawn on simultaneously. (Semantic, syntactic and graphophonic systems).
- Strategies to identify unknown words, prepare for reading and monitor and adjust reading are all essential elements.
- The use of current theory, practice and research guides assessment, teaching and learning experiences in GHSD.

Definition of Literacy:

The GHSD Literacy Framework defines literacy as it is defined by Alberta Learning:

"Literacy is more than the ability to read and write. It involves the knowledge, skills and abilities — the competencies — that enable individuals to think critically, communicate effectively, deal with change and solve problems in a variety of contexts to achieve their personal goals, develop their knowledge and potential, and participate fully in society." (Government of Alberta, 2009b, p.6)

The intension of the literacy framework is to provide teachers with an understanding of what literacy practices look like in GHSD and build consistency, common language, common benchmarks and assessments. It is intended to serve as a guide to improve literacy learning for all students. The framework will be reviewed and revised regularly to reflect and integrate current research and best practices. GHSD supports the statement made by Hargreaves and Fullan (2012) p 54, "Expert teachers are always consolidating what they know to be effective, testing it and continuously adding to it.", which is what we anticipate in GHSD.

The Literacy Learning Environment

The Literacy learning environment…..

- invites risk taking and persistence
- positive attitudes and beliefs about literacy growth
- assumes a growth mindset in the literacy environment
- fosters a safe environment, which enables open expression of opinions, questioning, wondering, innovating and creating so that every student's contributions are valued
- encourages reading daily and occurs across content areas
- provides students with access to a range of materials and technologies that offer a developmentally appropriate challenge
- groups students in flexible learner groups to meet needs, changing daily
- outlines authentic meaning-making purposes for reading thus providing incentive to read (i.e. to read for pleasure, to be informed and to perform a task
- provides scaffolded instruction with ongoing feedback in phonemic awareness, phonics, vocabulary, fluency and comprehension develops independence
- encourages demonstration of understanding in a variety of ways.
- provides students with choice in how they communicate, document and reflect upon learning
- differentiates tasks that allow for all students to enter into the learning
- highlights the importance of making explicit the purpose, audience and settings for literacy tasks. Teachers keep in mind that literacy has different purposes with consideration given to different contexts and cultural groups.

Best Practices in Grades 1-6

The top approaches/programs identified that should be available to all students in GHSD include:
ELI, Leveled Literacy Intervention, Daily Five, Guided Reading and Academic Vocabulary.

What did we hear? (Teachers in GHSD were invited to provide input into the literacy Framework.)

- Most teachers (1-6) report using **the Daily Five, Literacy Place**, or **Momentum Literacy in Motion**, where Guided reading is incorporated.
- Leveled Literacy Intervention is described as highly effective in improving literacy competencies. It is being used in a number of schools. Teachers report it is hard to fit in the targeted group but when they did, it made a difference.
- Most teachers are intentional about teaching academic vocabulary.
- Most teachers (1-9) report that they use a variety of resources and pull materials for teaching literacy from numerous sources and programs.
- Daily home reading programs are used in lots of classrooms. Lower grades use Reading A-Z or RAZ Kids. Upper grades often report using Literature circles or novel studies.
- Almost all teachers report that they **use Empowering Writers/Barbara Mariconda's program and 6+1 Traits.** Lots use parts of Betty Wiebe's Blended Style and Structure.
- Teachers would like to see common writing prompts and revised common rubrics for the prompts.
- Most teachers use weekly spelling tests but most do not see the transfer to writing. Looking for other ways to build spelling skills.

Literacy Assessment

Literacy assessments provide teachers with information about the learner's progress in acquiring literacy skills and help to determine next steps. GHSD recognizes that listening to a student read enables teachers to understand the strategies used by the students, the struggles they are encountering and how to provide feedback to enhance their reading.

A common set of literacy assessments in GHSD will enable teachers to determine the progress of their students and track this over time. It also enables teachers and administrators to determine the specific literacy skills gained during a set period of time. Through common assessment students who are "At Risk" can be identified and a plan developed for how to meet the needs of all students. Through monitoring student progress, insights can be gained about what approaches and strategies might have the greatest impact on learning.

GHSD teachers employ assessment "for learning" (using information to guide instruction and improve student learning), assessment "as learning" (students using assessment information to improve their own learning) and assessment "of" learning (summarizing and making judgments about the quality of learning) to improve literacy skills. The importance of sharing learning targets and co-constructing what success looks likes for students is identified and practiced. Teachers gather, analyze and interpret evidence of literacy learning over time, using a variety of tasks, assessment strategies and documentation.

Literacy Framework Implementation Plan

The Literacy Framework implementation plan was developed based upon the consolidated feedback from teachers obtained through interviews, as well as feedback from administrators. Your input is appreciated and continued feedback is encouraged as we begin implementation of the Literacy Framework in 2015-2016.

Assessment Plan K-6

Assessment	Implementation	Timeline for implementation
Reading: All grade 1-3 students will be administered one of the following twice a year (fall and spring): 1) Fountas and Pinnell Reading Benchmark Assessment 2) DRA Assessment 3) Informal Reading Inventory IRI as well as Running records of leveled texts (i.e. RAZ kids) to determine level of reading. The IRI could be administered with all the students and if at risk students are identified, either the DRA or Fountas and Pinnell Benchmark assessment can be administered.	Schools will confirm the assessments their teacher's grades 1-3 will use and will complete summary tracking forms. Teacher training on assessment strategies such as running records and F&P and DRA will be provided**.** **>Spring 2015:** Schools not using F&P or DRA can request coach training or an In-service will be set up if required.	**>Spring 2015:** Schools not using the Fountas and Pinnell or DRA will be provided an opportunity to be in-serviced on these assessment tools **>2015=2016** Teachers will compile results of reading levels of students (Fall and Spring). Teachers will be provided a tracking tool for pre and post (Fall and Spring) reading levels**.**
Suggested IRI and Word Lists: IRI- Alberta Diagnostic Informal Reading Inventories, Jerry John's Informal Reading Inventory, Ekwall Word Lists: Schonelle word list, San Diego Quick word list, Dolch Word List		
Writing: Students K-5 will be administered two common writing assessments each year (October and May). Grade 6 students will only be administered the fall common writing assessment.	Develop common writing prompts and common marking rubrics for each grade level. Teacher teams will develop common expectations by having time to mark in groups.	**>Spring 2015:** Teachers will collect writing samples using a variety of forms/structures of writing at the four levels (LPSE) **>June 2015:** Grade level representatives (K-6) will meet to revise rubrics (GLA binder rubrics) and begin to compile exemplar banks. They will also select possible prompts for the common writing assessments. This work will be brought back to each grade level team in the fall**.** **>Collaborative Day 1 and/or Sept. PLD day, 2015**: Teachers will work in collaborative teams to mark and review/revise exemplar banks for each grade level using the exemplars they collected in the spring. Teachers will select two common writing prompts for Oct and May. >**2015- 2016** Teachers will administer the common writing prompts in all classrooms K-5. Grade 6 will administer only the fall prompt and the year-end assessment will be the PAT's.

*** Information will be gathered throughout the course of the year. This data and information will be reviewed annually in order to determine the impact of our plan and identify next steps. The goal will be to look for patterns and ways to support the literacy work in GHSD.**

There are a variety of resources and approaches to teaching Literacy. The following have supporting research that demonstrates a high impact on student learning. (For a more in-depth description of the recommended approaches/programs please refer to the literacy framework)

Recommend Resources/Approaches Summary:

Early Literacy Initiative (ELI) Program- ELI is a targeted intervention provided to at risk learners in grade 1 and 2.

Leveled Literacy Intervention Program (Fountas and Pinnell)-LLI is a small group intervention system to be implemented by classroom teacher in a pull-in or push-out model.

High School English/Social Project-All High School English teachers and Social Studies Teachers are involved with a Cross Jurisdictional Project to increase students ability to write critical essays. Dynamic models, annotated rubrics and use of peer and self assessment comprise this project

Words Their Way Program-Words Their Way is a developmentally driven, practical instructional approach to word study. Through hands-on activities, it helps students explore and construct knowledge about words

Guided Reading-Guided reading is based on finding books at students' instructional reading level. The teacher acts as a facilitator in small flexible groups where students analyze what they read while using proven reading strategies such as summarizing, predicting, clarifying, predicting, connecting, and more

Daily Five-Structure for providing a balanced literacy program

Academic Vocabulary-Academic vocabulary instruction involves identifying and explicitly teaching the words that students must know in order to establish a foundation to construct knowledge.

Writing Initiatives: Barbara Mariconda, 6+1 Writing Traits, Blended Style and Structure

Literacy Progression

Hattie (2009) describes the importance of teachers having a common understanding of the reading progression. The GHSD Literacy Framework will include a literacy progression that will guide literacy instruction in GHSD. The Alberta Learning Literacy Benchmarks are aligned with the literacy progression in GHSD.

GHSD Literacy Initiatives and Components	Actions
Early Literacy Initiative (ELI) Program ELI is a targeted intervention provided to at risk learners in grade 1 and 2.	Continue to implement this intervention in all schools- grades 1 and 2. CBV implemented intensive intervention using both ELI and Leveled Literacy Intervention. Pre and post data and summary report for all students are created and compared to annual results. Coordinated by Sue Humphry.
Leveled Literacy Intervention Program (Fountas and Pinnell) LLI is a small group intervention system to be implemented by classroom teacher in a pull-in or push-out model. http://www.fountasandpinnellleveledbooks.com/	All elementary schools (Gr.1 & 2) were invited to pilot LLI project 2013-2014. Participating schools completed a proposal for implementation. Kits were placed in those schools for one year and pre and post data was collected to track student progress. This pilot was extended for the 2014-2015 school year. Westmount, Hussar, Standard, Rockyford, Carbon, Acme and Dr. Elliott, Three Hills and Trochu-Valley, Greentree, PCA are part of the project. School proposals were approved with tracking and follow up to occur within the division project.
High School English/Social Project All High School English teachers and Social Studies Teachers are involved with a Cross Jurisdictional Project to increase students' ability to write critical essays. Dynamic models, annotated rubrics and use of peer and self-assessment comprise this project. http://www.peervision.ca/	All English and Social Studies High School teachers are working in a project to develop student's skill in writing a critical essay. A peer and self-evaluation tool, AIR (Annotated Rubric) has been developed into an online editing tool. Outcomes include increased critical thinking through writing.
Words Their Way Program Words Their Way is a developmentally driven, practical instructional approach to word study. Through hands-on activities, it helps students explore and construct knowledge about words. http://www.pearsonhighered.com/educator/series/Words-Their-Way-Series/10888.page http://www.elltoolbox.com/words-their-way.html#.U4dW65RdVuU	There has been some training and implementation of the program in some schools.

Guided Reading Guided reading is based on finding books at students' instructional reading level. The teacher acts as a facilitator in small flexible groups where students analyze what they read while using proven reading strategies such as summarizing, predicting, clarifying, predicting, connecting, and more.	Teachers incorporate guided reading groups as part of the Daily Five. This is an effective way to teach targeted strategies for students grouped flexibly in small groups.
Daily Five Structure for providing a balanced literacy program Hattie (2009) describes the support for the five pillars of reading instruction which are foundational to the Daily Five. Attending to all five areas is important including phonemic awareness, phonics (Word Work), fluency, vocabulary and comprehension. He also states that a combination of vocabulary, comprehension and phonics instruction with repeated reading opportunities is the most powerful set of instructional methods. The Daily Five incorporates these instructional elements into program with all aspects of the Daily Five strategies founded on research. http://www.the2sisters.com/theDaily5.html http://www.thedailycafe.com/public/department104.cfm	Teachers have attended PD at the district level and have accessed coaches to help set this structure up in their classrooms. The content of the components found in the Daily Café are all research based, best practices to increase literacy skills.
Academic Vocabulary Academic vocabulary instruction involves identifying and explicitly teaching the words that students must know in order to establish a foundation to construct knowledge. http://www.marzanoresearch.com/vocabulary http://www.ncresa.org/docs/PLC_Secondary/Six_Step_Process.pdf	Continue to identify and teach essential words for knowledge construction through explicit teaching academic vocabulary. Begin looking at the morphology of the words being studied.

Literature Circles Developing Phonological Awareness Balanced Literacy RAZ Kids Reading A-Z	Continue to develop in the district.
Strategies to Achieve Reading Success (S.T.A.R.S.) **First Steps (K-6)** **Stepping Out (7+)** A resource of strategies that focuses on improving pedagogy for all students by extending teachers' skills and understanding about literacy and learning. http://www.pearsoncanadaschool.com/index.cfm?locator=PSZpP5	Recognize and implement the appropriate strategy to effectively teach the skills students are required to obtain as listed in the learner outcomes. All resources are now available to all teachers (website on Learning Commons)

Writing Initiatives:	
Barbara Mariconda http://www.barbaramariconda.com/ http://empoweringwriters.com/	Barbara Mariconda has developed resources for teaching students how to write both narrative and expository text. Specific steps and strategies are taught using a structure that improves students writing skills.
6+1 Writing Traits http://educationnorthwest.org/traits	The 6+1 Trait® Writing Model of Instruction & Assessment comprises 6+1 key qualities that define quality writing. These are: **Ideas**—the main message **Organization**—the internal structure of the piece **Voice**—the personal tone and flavor of the author's message **Word Choice**—the vocabulary a writer chooses to convey meaning **Sentence Fluency**—the rhythm and flow of the language **Conventions**—the mechanical correctness **Presentation**—how the writing actually looks on the page
Blended Style and Structure (Betty Wiebe)	Writing program developed by Betty that teaches students the structure of writing. Resources are available in IMC.
Literacy Assessments: **Reading Inventories and Checklists** Pre and post assessments are administered to determine effectiveness of instruction and level of functioning of student	See Implementation plan
Diagnostic Reading Assessment (DRA) http://www.scholastic.com/parents/resources/article/book-selection-tips/assess-dra-reading-levels	See Implementation plan
Fountas & Pinnell Benchmark Assessment System (B.A.S.)	See Implementation plan

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APPENDIX .

bdzY˙ŜℕJl·Ǒề Framework

GHSD NUMERACY FRAMEWORK (K-12)

Revised April 9, 2015

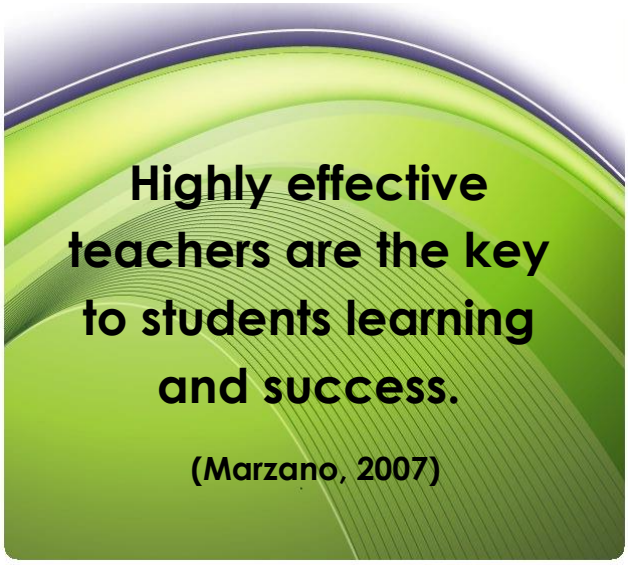
GHSD NUMERACY FRAMEWORK (K-12)

Revised April 9, 2015

The objective of this framework is to strengthen instructional practice to enhance learning and achievement for all students in literacy and numeracy as part of the Powerful Learning model.

Why is this framework being developed?

GHSD believes that continuous school improvement and student success depends on the quality of instruction in classrooms.
To have in depth conversations about instructional practices, teachers need a common language. In addition to common language, all parties involved need to articulate a framework that defines and identifies key components regarding effective classroom instruction and practice in numeracy. Quality math initiatives and instructional strategies provide teachers in Golden Hills with recommended best practices.



Research indicates that initiatives are most effective with a division-wide focus and implementation. A small number of clearly defined goals tied to student achievement which are relentlessly pursued can be expected to result in the greatest gains.

The **purpose of this framework** is to inform educators about key numeracy initiatives and strategies.

The framework will:

- acknowledge the quality work already being done by teachers while pursuing continual growth in instructional practices to improve learning for all students.
- guide the work of all instructional leaders in supporting teacher growth and development.
- create a shared understanding about quality teaching and powerful learning.
- align and refine the focus for current and future initiatives.
- obtain commitment from all teachers and administrators to use this framework to engage in conversations and practices that lead to continuous improvements in teaching and learning.

(Adapted from Chinooks Edge QLE, 2014)

The framework is not:

- **a fad**
- **an evaluation tool**

Numeracy Framework Beliefs and Assumptions:

Numeracy is foundational to student learning. Being numerate means going beyond the acquisition of basic skills and solving simple arithmetic problems to being able to acquire, create, connect, understand and communicate information.

Guiding Principles

The National Mathematics Advisory Panel states that learning mathematics requires three types of knowledge:

Factual knowledge and automatic retrieval of basic math facts refers to having ready in memory the answers to a relatively small set of problems of addition, subtraction, multiplication and division.

Procedural knowledge refers to a sequence of steps by which frequently encountered problems may be solved.

Conceptual knowledge is an understanding of meaning. Students must understand the "why" of a mathematical concept.

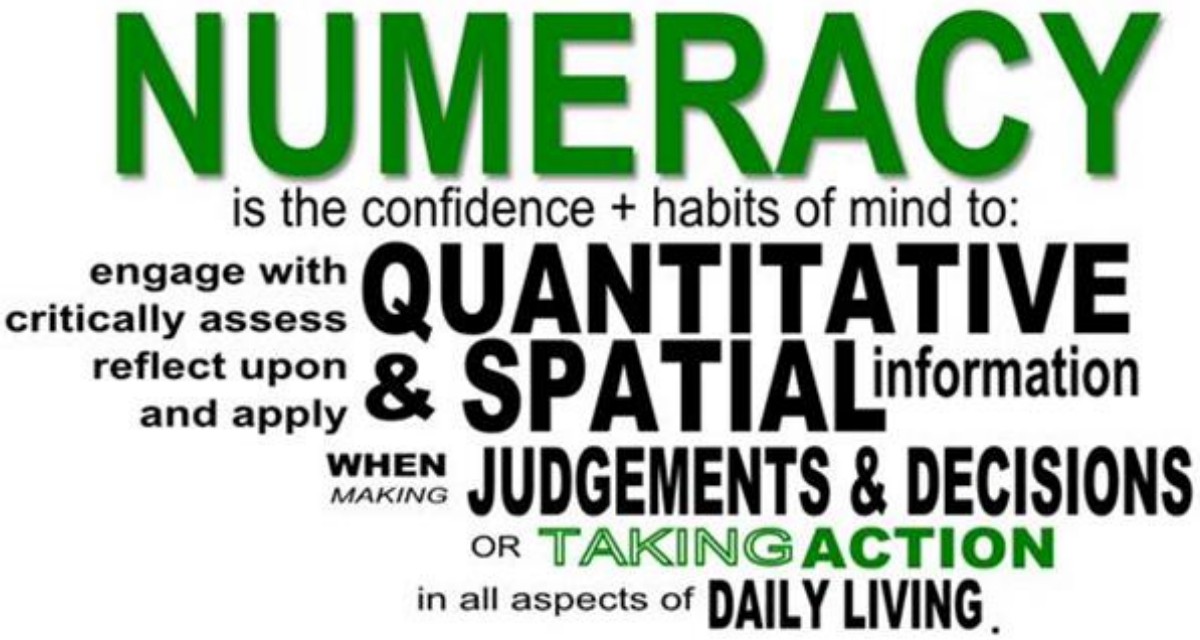
The following statements describe the assumptions which guide teachers in the implementation of numeracy instruction in GHSD:

- Students need help making sense of the world around them by being provided opportunities to understand where math lives in the real world.
- Through mathematics students will be able to discover patterns, explain real world phenomenon and solve real world problems.
- Understanding and being able to manipulate patterns is central to achieving a deep level of understanding in mathematics.
- Finding, exploring and making sense of patterns and subitizing is foundational to becoming a numerate citizen.
- Mathematical learning is enhanced when students connect new learning with previous knowledge and understanding.

- Students are encouraged to make connections and understand the mathematics they are exploring through worthwhile tasks which invite students to take risks, share and defend mathematical ideas.
- Students use a variety of representations to demonstrate their understanding of mathematical concepts and communicate this understanding through academic vocabulary.
- The mastery of number facts occurs when students understand and recall facts in order to apply their knowledge to solve more complex computations. In addition, students need to be able to apply number facts to critically solve problems, reason and justify answers. Depth of understanding is valued more than speed.

Definition of Numeracy:

The GHSD Numeracy Framework defines numeracy as it is defined by Alberta Education (2014, p. 12):



"Numeracy is the confidence and habits of mind to: engage with, critically assess, reflect upon, and apply quantitative and spatial information when making judgements and decisions or taking action in all aspects of daily living" (Alberta Education, 2014, p. 12).

Golden Hills School Division strives to engage all learners with varied abilities and unique experiences to reach a deep understanding of numeracy across all curriculum areas. A deep understanding of math is based on a strong foundation that includes mastery of basic facts/mental mathematics strategies as outlined in the Alberta Mathematics Program of Studies.

In order to improve achievement, it is vital that we increase the math confidence levels in our students. This framework is designed to help teachers understand the importance of determining the entry level of each student and to facilitate student success through carefully created tasks and activities. To accomplish this, the student and teacher work together setting math goals/targets and continuously reflect on student progress as they move towards these goals and mastery of numeracy concepts.

Golden Hills Numeracy Framework identifies best practices and resources to guide teachers in the implementation of Alberta Mathematics Kindergarten to Grade 9 Program of Studies. The framework was developed with careful consideration and integration of the Golden Hills Powerful Learning document as well as the Inspiring Education document, which states all students will be inspired to achieve success as engaged thinkers and ethical citizens with an entrepreneurial spirit (Inspiring Education – A Dialogue with Albertans, 2010).

"Teachers are key figures in changing the way in which mathematics is taught and learned in schools. Their subject matter and pedagogical knowledge are critical factors in the teaching of mathematics for understanding. The effective teacher of mathematics has a thorough and deep understanding of the subject matter to be taught, how students are likely to learn it, and the difficulties and misunderstandings they are likely to encounter."

(New Zealand Ministry of Education, 2010)

Classroom Environments to Foster Deep Understanding

An engaged “numeracy” learning environment fosters communication, collaboration, creativity and critical thinking.

Make connections to their background and experiences.

To create an engaged classroom, THE TEACHER purposefully establishes a safe and dynamic environment that:

- encourages persistent effort, engages students in a *productive struggle* and helps students embrace challenge.
- supports risk taking.
- links foundational math with open-ended problem solving to develop critical thinking skills that extend beyond the classroom.
- provides opportunities for the formation of real world connections.
- promotes student collaboration, open reflection and discussion about concepts and learning.
- creates a community of thinkers.
- develops competencies in the application of mathematics.
- provides timely and specific feedback that moves the learning forward.
- fosters a growth mindset where students see effort as a path to mastery.

“There will always be differences between students, but we don’t need to exaggerate or highlight them by setting up unnecessary hierarchies. By using materials and methods that minimize differences, teachers can cover more of the curriculum and can narrow or close the wide gap in student performance that exists in most classrooms”

Retrieved from http://www.jumpmath.org/jump/en/Philosophy

Role of THE STUDENT:

- share ideas in an environment of acceptance, where it is safe to take risks.
- assume a growth mindset: a belief that growth and learning require effort.
- realize that mistakes provide opportunities for learning.
- demonstrate persistence and embrace challenge when solving complex problems.
- make connections between different strategies, concepts, and contexts to solve a particular problem.
- be strategic in selecting best suited strategies.
- monitor and self-reflect on the process - catching and adjusting errors along the way.
- use critical thinking skills and strategies that extend beyond the classroom.
- demonstrate a deep understanding of the connections mathematics plays in the real world.
- reflect on and communicate learning in realistic and meaningful contexts.
- demonstrate confidence in numeracy.
- engage actively by communicating through the use of mathematical language.

"The learning environment must be respectful of individuals and groups, fostering discussions and self-reflection, the asking of questions, the seeking of multiple answers, and the construction of meaning."

(Saskatchewan Ministry of Education)

Components of a Balanced Numeracy Program

Foundational Skills

Number relationships (number sense) provide the foundation for strategies that help students remember basic facts. Alberta Education (2014, p. 2) states, “The mathematics program of studies expects students to master their number facts. Mastery of number facts occurs when students **understand and recall** facts.

This allows students to apply their knowledge to different and more complex computations and to be flexible in their thinking."

When implementing the "Mathematics program of studies", Golden Hills School Division recognizes the need of ensuring students master foundational skills (which includes basic facts) as well as, students learning by "doing" and being provided high-quality tasks that allow them to figure out their own strategies and solutions to problems. Mastery of basic facts enables quick and accurate recall, which is foundational to being able to solve complex computations and problems.

Understanding early number concepts and number relationships is essential when learning basic facts. For example, the strategy of knowing how numbers are related to 5 and 10 helps students to master the facts. Strategies outlined in Van de Walle's work and programs such as "*Jump Math"* and "*Power of Ten*" help students to recognize patterns and understand "number relationships". Subitizing (being able to see how many there are at a glance without counting) when directly taught and practiced is fundamental to developing students concept of number. Teaching strategies in math enables students to use known facts and relationships to solve unknown facts. Mastery occurs best when students understand number concepts and relationships rather than rote drill of facts. "Students who encounter difficulty with mastering basic facts typically do not lack drill instead it is the failure to develop or connect concepts and relationships that is the barrier" (Van De Walle et al., 2013, p.186). The pressure of timed tests for fact mastery distracts students, creates anxiety and results in students abandoning reasoning required for completing the basic fact. Quick recall and mastery can be obtained when students are ready, in other words once they have acquired a collection of reasoning strategies that they can apply when needed.

Observing students when they encounter an unknown fact enables a teacher to analyze current strategies used by the student and helps to provide the next steps in learning.

Problem Solving/Critical Thinking

Problem solving encourages students to look for relationships, analyze patterns, employ trial and error methods and justify and evaluate results (Van de Walle, J. A. & Lovin, L. H., 2006). Students are asked to apply foundational math skills to solve authentic problems and to be creative and flexible in their thinking. Problem solving skills need to be taught and practiced. "Learning through problem solving should be the focus of mathematics at all grade levels" (Alberta Education, 2007, p. 6).

Academic Vocabulary

Academic vocabulary instruction involves identifying and explicitly teaching the words that students must know in order to establish a foundation to construct knowledge. "Teaching specific terms in a specific way is probably the strongest action a teacher can take to ensure that students have the academic background knowledge that need to understand the content they will encounter in school" (Marzano & Pickering, 2005, p.1).

Formative Assessment

Formative assessment can be seen as an on-going process that relies on several measures over time. It is viewed as a process rather than a singular event (Bennett, 2011). Formative assessments use information from the judgment of student work and performance to improve student achievement (Sadler, 1989). Students are provided with feedback as to how successfully a task has been completed or is being completed. They use this feedback to improve upon their achievement. Information collected through the use of formative assessment is used to further student learning (Ayala, 2005). Teachers create instruction based on evidence gathered through formative uses of assessment. These formative interactions are designed to encourage thought on the student's part (Black & William, 2009). Teachers use information from these interactions in order to make decisions surrounding the curriculum and the direction of learning. They determine whether to move forward, how to move forward and where to encourage student focus. This view focuses on the process of developing and changing instruction to match student needs.

Numeracy Assessment

Numeracy assessments provide teachers with information about the learner's progress in acquiring numeracy skills and help to determine next steps. GHSD recognizes that observing a student engaged in numeracy activities, enables teachers to understand the strategies used by the students, the struggles they are encountering and how to provide feedback to enhance their understanding of numeracy.

A common set of numeracy assessments in GHSD will enable teachers to determine the progress of their students and track this over time. It also enables teachers and administrators to determine the specific numeracy skills gained during a set period of time. Through common assessment students who are "At Risk" can be identified and a plan developed for how to meet the needs of all students. By monitoring student progress, insights can be gained about what approaches and strategies might have the greatest impact on learning.

GHSD teachers employ assessment "for learning" (using information to guide instruction and improve student learning) and assessment "of" learning (summarizing and making judgments about the quality of learning) to improve numeracy skills. The importance of sharing learning targets and co-constructing what success looks likes for students is identified and practiced. Teachers gather, analyze and interpret evidence of literacy learning over time, using a variety of tasks, assessment strategies and documentation.

Numeracy Framework Implementation Plan

The Numeracy Framework implementation plan was developed based upon the consolidated feedback from teachers obtained through interviews, as well as feedback from administrators. Your input is appreciated and continued feedback is encouraged as we begin implementation of the Numeracy Framework in 2015-2016**.**

Assessment Plan Grades 1- 6

Assessment	Implementation	Timeline for Implementation
Diagnostic/Formative Assessment Grades 1-6* students will be administered a common formative assessment each year in the fall (September)	This will be used to provide information to teachers so they can plan learning activities for the year and identify at risk learners Examine a variety of math diagnostic/formative assessment tools for Grades 1-6* If required, teachers can request instructional coaches to set up school wide assessment on StudentsAchieve. Videos and step by step sheets will be available.	**>Fall 2015:** Grades 4-6 teachers will pilot a formative assessment and compile results in StudentsAchieve (School Wide Assessment tab) If developed, Grades 1* will pilot as well **>Fall 2016:** Grades 1-6* teachers will and compile results in StudentsAchieve (School Wide assessment tab)
Common Unit Exams	Grade level teams have used collaborative days to develop common unit exams	**> 2015-2016:** Some grades will pilot common summative unit exams
Summative Assessment Grade 1-6* students will be administered a common summative math assessment each year in the Spring (June*)*	This will be used to show student progress.	**>Spring 2016:** Grades 1-5* Teachers will pilot a common summative assessment tool and compile results in StudentsAchieve (School Wide Assessment tab) **> Spring 2017:** Grades 1-6 teachers will administer a summative math assessment in June

***Consideration will be given to students already writing an SLA and/or a PAT**

> Information will be gathered throughout the course of the year. This data and information will be reviewed annually in order to determine the impact of the plan and identify next steps. The goal will be to look for patterns and ways to support the numeracy work in GHSD.

There are a variety of resources and approaches to teaching numeracy. The following have supporting research that demonstrates a high impact on student learning. (For a more in-depth description of the recommended approaches/programs please refer to the numeracy framework)

Recommend Resources/Approaches Summary:

Academic Vocabulary:
Academic vocabulary instruction involves identifying and explicitly teaching the words that students must know in order to establish a foundation to construct knowledge.

Jump Math:
This program delivers the mathematical curriculum through the method of "guided discovery." In JUMP lessons, students explore and discover mathematical concepts independently in manageable steps, while the teacher provides sufficient guidance, examples, feedback and scaffolding for all students to meet their full potential.

Power of Ten:
This **System** is a set of visual tools (ten-frame cards, place value cards and ten-frame egg cartons) designed to help students develop the fundamental underpinnings of number sense and is based on the premise that over eighty percent of learning is visual.

Other Resources:
A Numeracy course has been created on the Golden Hills Learning Commons to help support teachers and students in the area of numeracy. http://lc.myghsd.ca/course/view.php?id=545&section=0

Also see the sections in the numeracy framework on recommend:

- **Web-based math programs**
- **Supplementary math resources**

Golden Hills School Division will support and provide professional development opportunities in foundational skills (such as basic math facts), academic vocabulary, problem solving/ critical thinking, academic vocabulary, Jump Math and Power of Ten.

Recommended Numeracy Approaches/Programs

There are a variety of resources and approaches to teaching numeracy. The following have supporting research that demonstrates a high impact on student learning.

Intentional/Explicit teaching of Academic Vocabulary:

Research:
Marzano and Pickering (2005), reported that when students have general knowledge of the terms that are important to content taught in school, achievement is significantly improved. One of the most crucial advantages that teachers can provide, particularly for students who do not come from academically advantaged backgrounds, is systematic instruction in important academic terms.

Overview / Implementation:
Academic vocabulary instruction involves identifying and explicitly teaching the words that students must know in order to establish a foundation to construct knowledge.

Explicitly teaching academic vocabulary involves 6 basic steps. Attending to all steps ensures best results.
Step 1. Introduction: Provide a description, explanation and or examples of the new term.
Step 2. Restate: Students explain or describe the term in their own words. An academic notebook is suggested to keep track of the terms.
Step 3. Draw & Self Assess: Students draw a picture, symbol or graphic to represent the meaning of the term. Students self-assess their level of understanding of the term.
Step 4. Activities: Provide activities to engage students as they work to remember the terms. Ex: antonyms/synonyms, compare/contrast, morphology.
Step 5: Talk: Discussing the terms with a peer allows for misunderstandings to present themselves and knowledge to deepen.
Step 6: Games: An engaging way to learn the terms. Frequent use of the terms helps transfer the terms into long memory.

JUMP Math:

Research:

JUMP Math is recommended by the Canadian Language and Literacy Research Network as a program that "offers educators... complete and balanced materials as well as training to help teachers reach all students".

- *J. Bisanz et al. (2010) Foundations for Numeracy: An Evidence-based Toolkit for the Effective Mathematics Teacher. Canadian Child Care Federation and Canadian Language and Literacy Research Network, p. 44.*

In 2011, L. Alfieri et al. conducted a meta analysis of 164 studies of discovery-based learning and concluded that "Unassisted discovery does not benefit learners, whereas feedback, worked examples, scaffolding and explicit instruction do." The authors recommend "enhanced discovery" (discovery with the instructional supports mentioned above) as the most effective approach to instruction in mathematics.

- *Alfieri, L., et al. (2011) Does Discovery Based Instruction Enhance Learning? Journal of Educational Psychology, Vol. 103, Issue 1, p 1-18.*
- *See also the references below for evidence that discovery needs to be balanced with rigorous guidance: Anderson (2000), Gobet (2005), Van Merrienboer (2005), Ross (2006), Kirshner (2006).*

Overview / Implementation:

The JUMP Math program delivers the mathematical curriculum through the method of "guided discovery." In JUMP lessons, students explore and discover mathematical concepts independently in manageable steps, while the teacher provides sufficient guidance, examples, feedback and scaffolding for all students to meet their full potential.

JUMP lesson plans and materials allow teachers to differentiate instruction by providing extra practice, scaffolding and continuous assessment for students who need it, and more advanced work for students who finish their work early. But while instruction is differentiated, the significant majority of students are expected to meet the same standards.

http://jumpmath.org/jump/en/

Power of Ten:

Research:

New studies suggest that subitizing – learning to identify numbers without counting – is crucial to the development of number sense and basic fact acquisition. Power of Ten cards teach children ages 3-11 to subitize as they play.

Overview/Implementation:

The **Power of Ten System** is a set of visual tools (ten-frame cards, place value cards and ten-frame egg cartons) designed to help students develop the fundamental underpinnings of number sense and is based on the premise that over eighty percent of learning is visual (unless the student is severely visually disabled).

Spring 2015-train internal experts (coaches)

http://poweroften.ca/

Recommended Web-based Math Programs:

Program	Overview / Implementation
Mathletics	A web-based resource that is powerful, targeted and most importantly relevant to all students. Mathletics includes well over 1200 individual adaptive practice activities and eBooks for all grades. Our team of education publishers have created a course that follows the Alberta curriculum. This has potential for implementation through assistive technology. http://www.mathletics.ca/
Math IXL	Math IXL is online, outcome-based, math practice that addresses Junior Kindergarten to Grade 12 skills. Can be purchased by individual schools/teachers. http://ca.ixl.com/math/
Prodigy	Prodigy is a web-based game that is engaging and adapts to each students learning pace. This program is free to sign up. Exclusive member can pay for added features https://www.prodigygame.com/Canada/

Supplementary Math Resources:

***All are available for loan through IMC.**

Resource	Overview / Implementation
About Teaching Mathematics (K-8)	Marilyn Burns A teacher resource book on developing children's ability to think and reason mathematically and help them learn the concept and skills to do so.
Big Ideas (K-12)	Marian Small This resource reminds teachers the Big Ideas in math need to drive our instruction.
Teaching Student-Centered Mathematics K-3, 3-5 & 5-8	John A. Van de Walle & LouAnn H. Lovin This resource focuses on a student-centered, problem-based approach that helps students develop confidence and a deeper understanding of mathematics.
From Patterns to Algebra	Drs. Bruce and Beatty This resource has students work through tasks starting with simple patterns and developing linear relations and graphs. K-10
Math & Literature (Division 1)	Marilyn Burns (Division 1) There are a number of these books in the IMC on the different math stands. Each book has suggested activities and samples of student work. This resource also accompanied by the literature book.
Writing in Math Class Gr. 2-8	Marilyn Burns This resource explains why students should write in math class, the types of writing and tips and suggestions.
50 Problem Solving Lesson Gr.1-6	Marilyn Burns This resource has 50 math problem solving lessons from all of the math stands. It also includes student examples and blackline masters.

*Future development: Links to teacher demonstration videos, parent and teacher supporting materials

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