SRS Math Department

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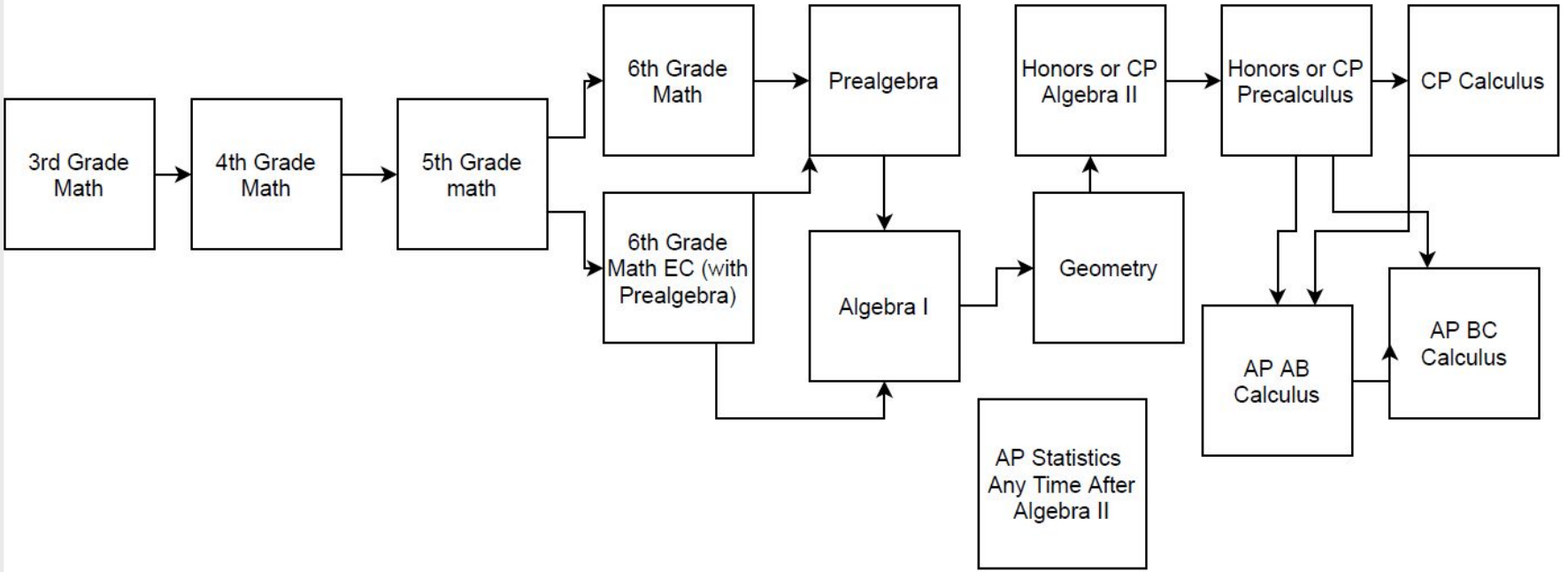
SRS Mathematics Flowchart



Lower School Teaching Theoretical Basis

Piaget's work on Cognitive Development
The Concrete Operational Stage

- Children begin to think logically about concrete events.
- Their thinking becomes more logical and organized, but still very concrete.
- *Children begin using inductive logic, or reasoning from specific information to a general principle.*
- Students at this point tend to struggle with abstract and hypothetical concepts.

Lower School Teaching Philosophy

Jerome Bruner’s work on the Learning Theory of Development

- The curriculum is comprised of three characteristics:
  - Students revisit the same topic at regular intervals
  - The complexity of the topic increases with each revisit
  - The new learning has a relationship with previous learning
- For concrete thinkers, learning should take three stages:
  - Real-world
  - Iconic pictures like circles
  - Symbolic representations, x and y
- Steps for new material
  - Teacher demonstrates
  - Students work with constant support and feedback

Lower School Teaching in Action:

- Learning starts with drilling and practice to assure a mastery of facts and computation which leads to assimilation and automation. Inquiry based learning is used often
- The textbook progression is based on the Common Core so it is vertically aligned and uses Bruner's spiralling.
- Math in Focus, by design, is based on Bruner's three stages.
- Daily classes are taught using Bruner's two steps and three stages.
- Learning is expanded with peer interaction and real-world examples to stimulate critical-thinking, inquiry, and creative thinking.

Middle and Upper School Teaching Theoretical Basis

Piaget's work on Cognitive Development
The Formal Operational Stage

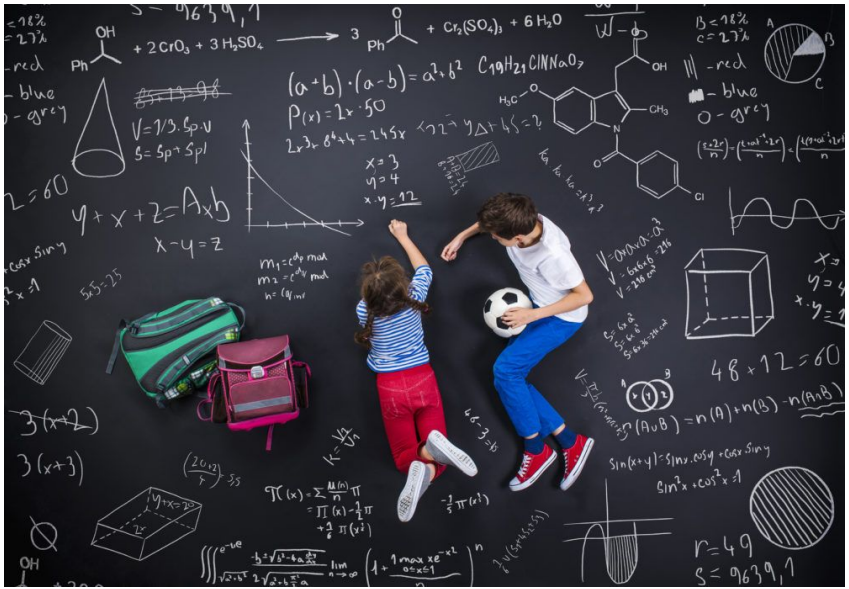
- Abstract thought emerges.
- *They begin to use reasoning from a general principle to specific information.*
- Young adults begin to think abstractly and reason about hypothetical problems.
- For abstract thinkers, learning should start with the consideration and manipulation of rules, operations, methods and concepts removed from real-world connections.

Middle and Upper School Teaching Theoretical Basis

Jerome Bruner’s work on the Learning Theory of Development

- The curriculum is comprised of three characteristics:
  - Students revisit the same topic at regular intervals
  - The complexity of the topic increases with each revisit
  - The new learning has a relationship with previous learning
- Stages
  - Theoretical
  - Iconic and real-world applications.
- Steps for new material
  - Teacher demonstrates
  - Students work with constant support and feedback

Middle and Upper School Teaching in Action:

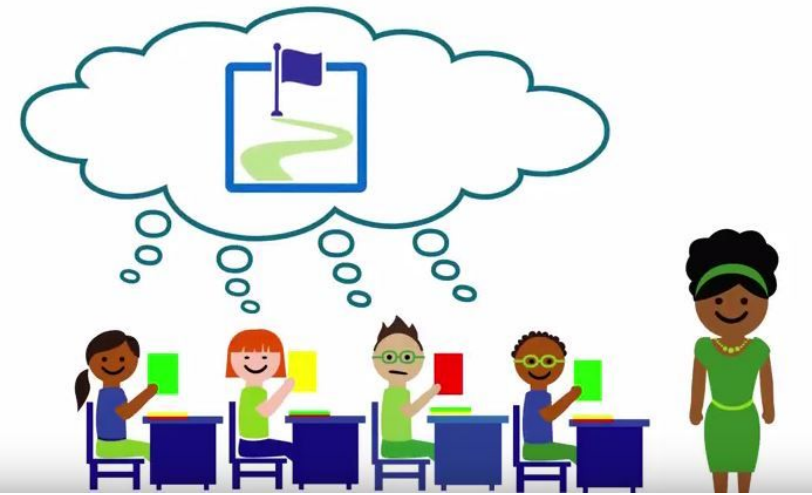


- Same drill and practice. Inquiry is used when appropriate.
- Common Core aligned
- For abstract thinkers, learning should start with the use the consideration and manipulation of rules, operations, methods and concepts removed from real-world connections.
- Teach using Bruner’s steps and stages.
- Learning is expanded with peer interaction and real-world examples to stimulate critical-thinking, inquiry, and creative thinking.

Student Engagement - How to Measure

- Class Participation - Clearly define it and measure it
  - Remains seated throughout the class
  - Does what is asked of them
  - Stays on task
  - Follows along during instruction
  - Asks questions and engages in discussions
  - Every class is a bit different. Grading should be in the syllabus. If it is not, please talk to the teacher.

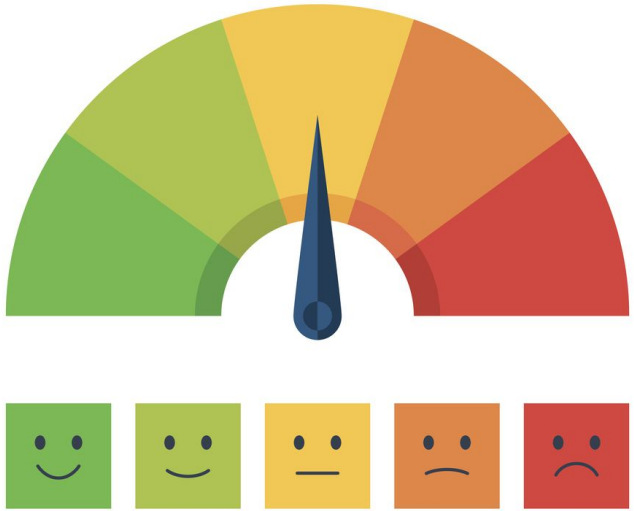
Student Engagement - How to Measure



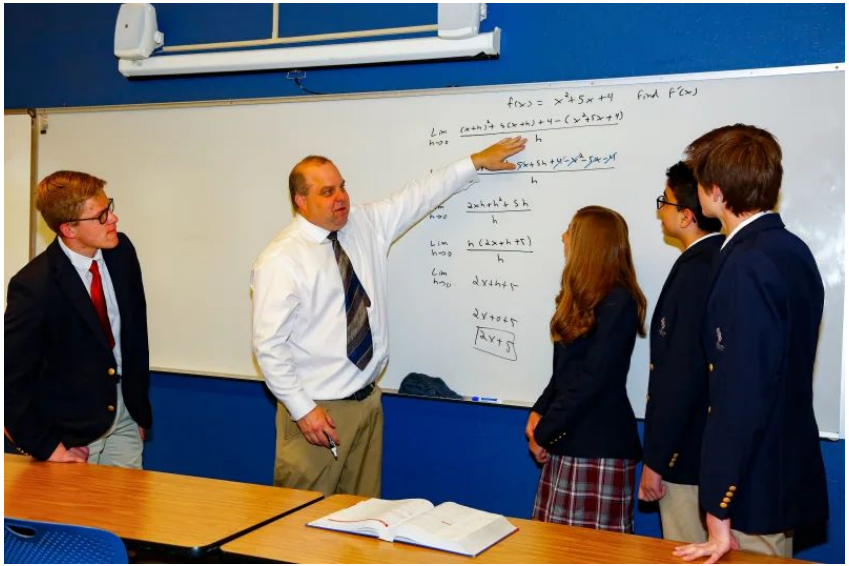
- Formative Assessments - spot checks on comprehension and usage
  - Question and answer session
  - Whiteboard work or individual work
  - Pre-assessments at the start of a unit or chapter
  - Homework and Quizzes
  - Exit work - Exit Tickets, Final Questions
  - Reteaching
  - Quick class polls
  - Asking to summarize in own words
  - Diagraming a situation or a visual representation
  - Open ended questions.
  - *Practice, Feedback, Self-analyze, Repeat.*

Student Engagement - How to Measure

- Student Reported Data
  - We seek verbal feedback from students on how classes are going, how individual lessons are going, what is working, and what they would like to see done differently.
  - There are math department student surveys that can be given out when more information is needed based on the verbal feedback.



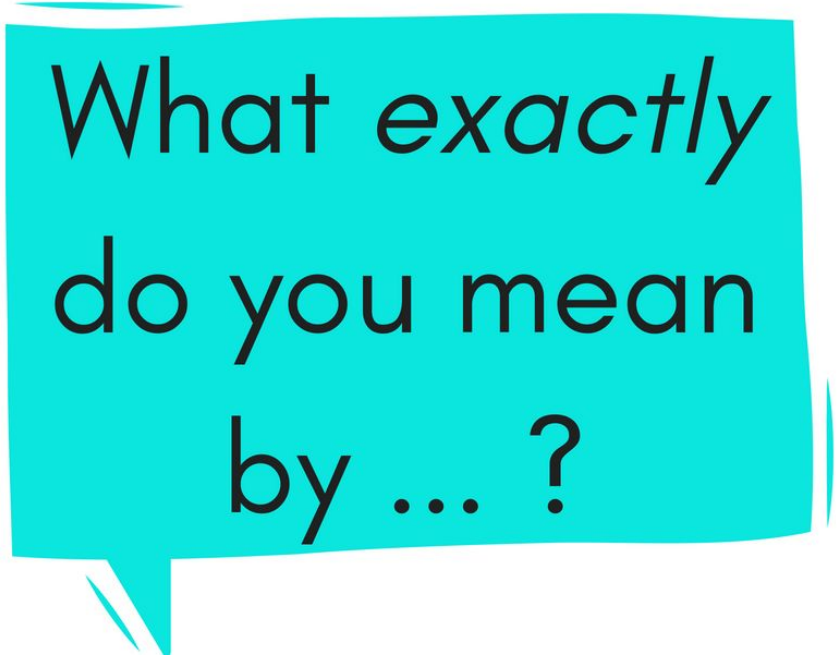
Student Engagement - How to Measure



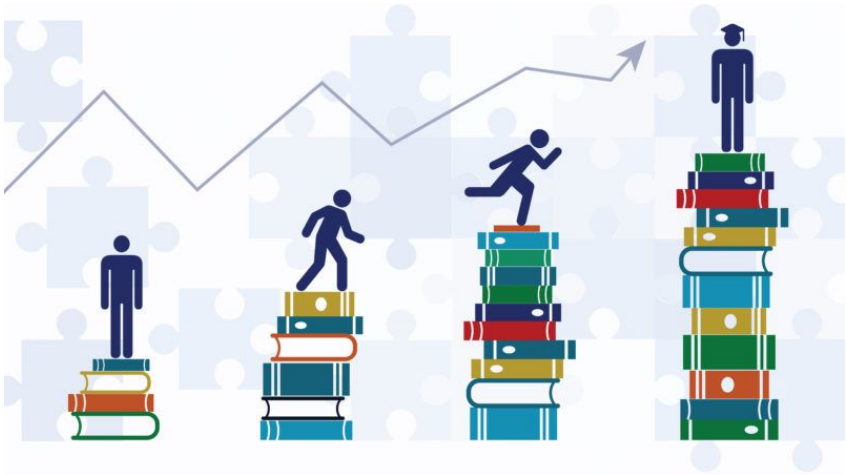
- Observational Data
  - How do students react to the day's lesson?
    - Engaged
    - Lost
    - Zoning out
    - Talking
    - Working
  - How are questions answered?
    - Responses to direct questions
    - Willingness to try to answer an undirected question
    - Time needed to think about an answer before answering

How do we engage students beyond the basic material?

- Help kids invest in hard work.
- Encourage clarifying questions
- Emphasize a meaningful connection between a conceptual understanding and procedural work
- Use meaningful, authentic problems
- Helps students embrace mathematics
- Use enrichment and a higher level of challenge where appropriate
- Have math competitions available for kids who want to extend their learning outside the classroom
- Manipulatives, partner work, small group work, whole class instruction, and one-on-one meetings
- Allow mistakes and support the struggle
- Answering questions with questions where appropriate



How do we ensure students are progressing? Qualitative and Quantitative Data



- ***Tracking engagement is the primary way.***
- Summative data - tests and projects
- Standardized test
  - AP, SAT
  - MAP tests
  - Textbook based online benchmark tests.
- Year-to-Year Alignment
  - Are our kids coming to classes prepared?

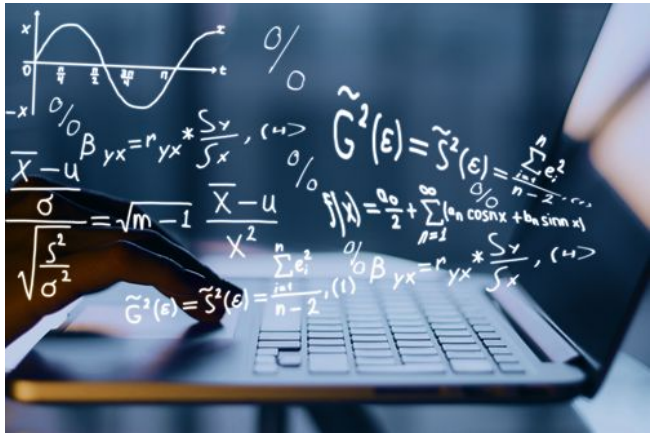
How are we using online resources in Lower School?

Textbook based

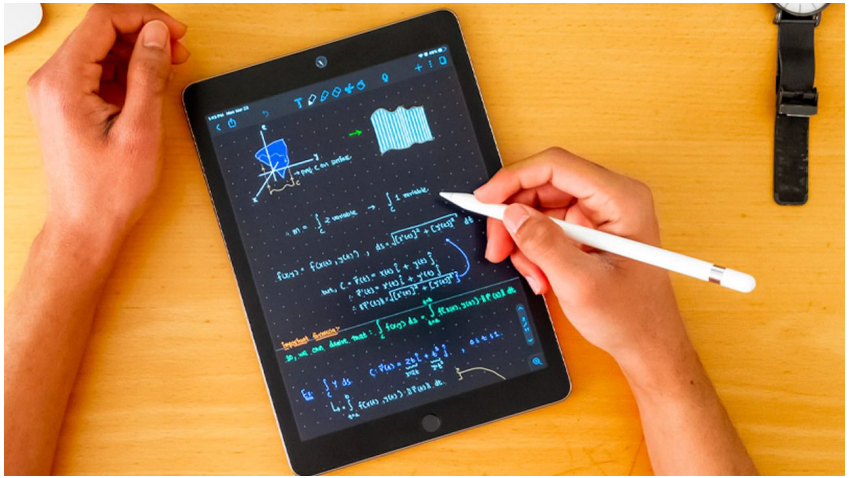
- Virtual Manipulatives
- Learn Videos
- Benchmark Assessments
- Lesson Quick Checks
- Mini-Games
- Enrichment and Challenges
- Reteaching
- More to come as we become more familiar with the online environment.

Non-Textbook Based

- Prodigy.com for math games
- Zearn.com for reinforcement
- Khan Academy to support review of taught material



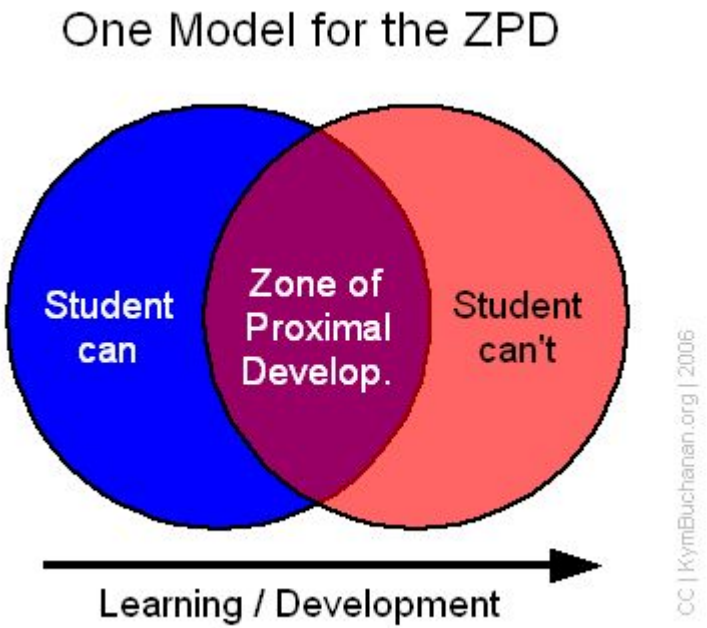
How are we using online resources in the Middle and Upper Schools?



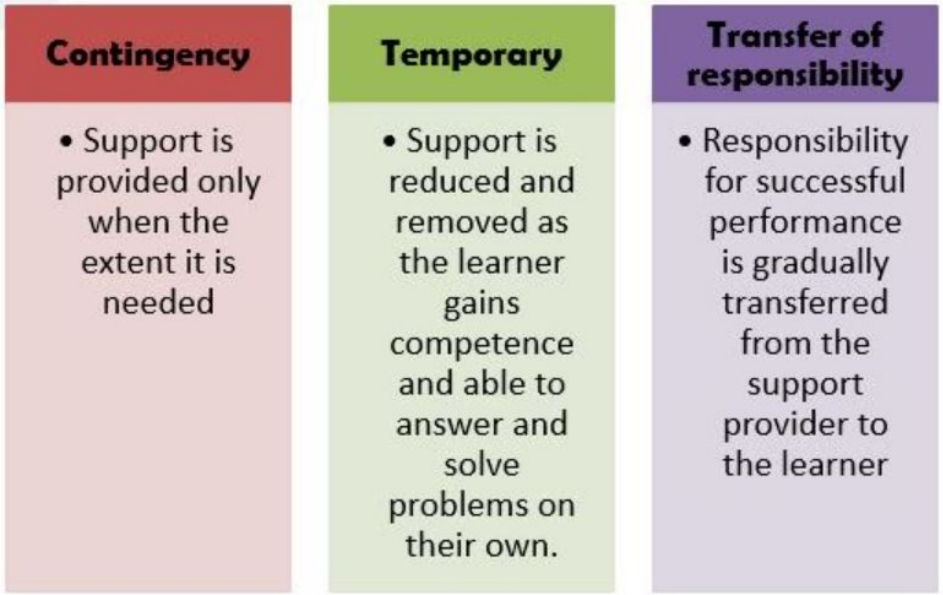
- AP Problem sets available through the College Board's website
- Quizziz.com and/or Kahoot to aid in review
- Khan Academy as a source for at-home review and reteaching after hours
- Textbook based review problems where available
- Datasets, Applets, and Activities

Outcome? - Lev Vygotsky's Zone of Proximal Development.

The space between what a learner can do without assistance and what a learner can do with adult guidance or in collaboration with more capable peers.



Bruner’s Scaffolding moves kids through the ZPD



- Some examples;
  - Use teaching methods described earlier in Powerpoint.
  - Get to know kids and how they learn.
  - Learn where a student is on the mathematics ladder.
  - Know a student’s readiness and interest.
  - Vary formative assessments.
  - Use flexible, pull-out, tiered, and compacted grouping based on need.
  - Manipulative and visuals.
  - Meet with students individually.

Thanks for coming!