Differentiation while implementing the ISLE methodology: One approach

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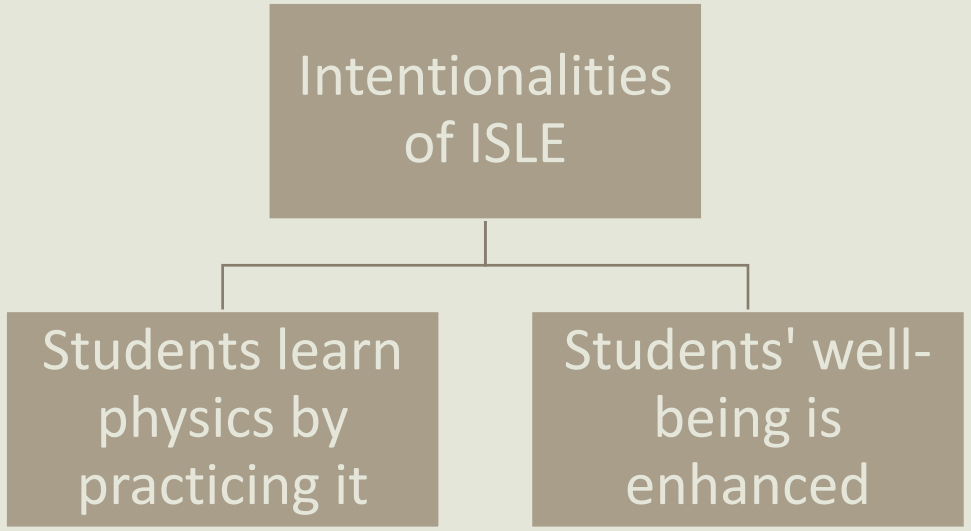
National Board Certification – Differentiation for Science

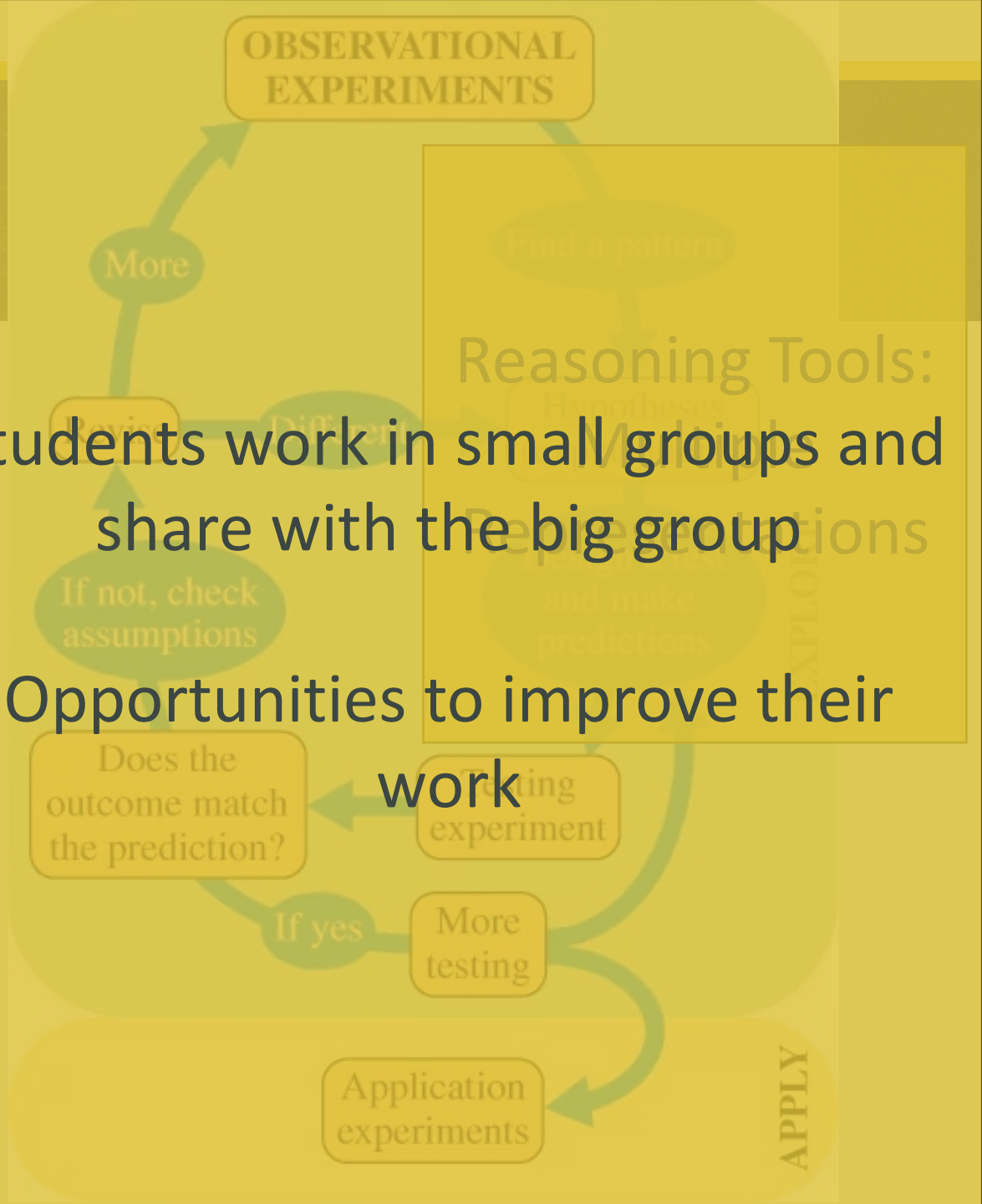
- Communicating with the students' social, cultural, emotional and developmental level
- Active learning includes problem solving, project-based learning and guided experiments
- Students can show multiple representations such as sketches, stories, graphs and functions
- Submissions can be in different formats: digital notebooks, pictures of paper notebooks, pictures of whiteboards for either individual or group work, Kami: online collaboration tool
- Group collaboration is formed and modeled. Explanations due to absences, due to somebody not understanding, differences in opinion based on evidence.
- Formative & summative assessments are different for an AP and Honors Physics group

Investigative Science Learning Environment - ISLE



Students work in small groups and share with the big group

Opportunities to improve their work



Source: Etkina, E., Planinsic, G., & Van Heuvelen, A. (2021). College physics: Explore and apply (2nd ed.). Pearson; http://pum.islephysics.net/; https://doi.org/10.1103/PhysRevPhysEducRes.16.020148;

School and Classroom Demographics and Schedule
Career and Technical High School

Plan

MTHS BELL SCHEDULE

1	9:00 - 9:42
2	9:45 - 10:27
3	10:30 - 11:12
4	11: 15 - 12:45
5	12:48 - 1:30
6	1:33 - 2:15
7	2:18- 3:00

LUNCH SCHEDULE

1	11:13 - 11:43
2	11:44- 12:14
3	12:15 - 12:45

Periods are 42min long
4th period is 60 min long.

I can use the lunch time for instruction.

	AP Physics 1 students	Honors Physics students
Maryland Assessment English	A	B
Lexile	1400	1226
Maryland Assessment Math	B	B
Maryland Assessment Science	B	B

Curriculum and Implementation at-a-glance

Plan

AP Physics 1	Honors Physics
Chapters 1-14 of Etkina's Textbook	Physics Union Mathematics (PUM) curriculum
ISLE Methodology	ISLE Methodology
2.5 weeks per Chapter using Active Learning Guide	PUM Kinematics, Dynamics, Momentum, Energy, DC Circuits, Waves and Optics
AP level quizzes and test	Quizzes: Problems reflect work in class
30 min of mandatory homework	No homework

Comparison of Kinematics lesson sequence and pacing

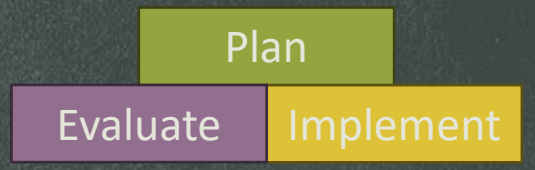
AP Phyiscs 1 (3 weeks)

- What is motion?
- A conceptual description of motion
- Operations with Vectors
- Quantities for describing motion
- Representing motion with tables and graphs
- Constant velocity linear motion
- Motion at constant acceleration
- Displacement of an object moving at constant acceleration
- Skills for analyzing situations involving motion
- Practice with textbook questions and problems
- Kinematics Quiz
- Pivot Interactives – Acceleration and Linearization

Honors Physics (9 weeks) / Short quiz per lesson

- Motion is Relative
- Which way is which?
- Constructing Dot Diagrams
- Graphing and Physical Quantities
- The Truth behind graphic representations
- Find where and when would we meet
- Inventing and Index
- Using slopes and making functions of lines
- How fast do you walk?
- When worlds collide!
- Motion Diagram: A new tool
- Time for stretching
- Average speed
- When speed is not constant
- Putting it all together

Challenges and Mitigations

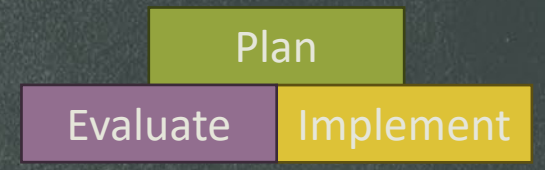


Not giving enough time to either of both groups of students	Interference between the two rostered classes in the same instructional setting	Not enough planning/grading time	Students regret their AP decision
• Concurrent Honors Physics class is still ahead of my other 2 periods of Honors Physics because of the longer period. • AP Physics students can work more independently	• It is a challenge when you want to turn the lights in one side of the classroom to show a video and the other side needs light was solved with a lamp. • Having the lunch shift helps because I have the Honors Physics second lunch shift and AP Physics the first lunch shift.	• I do not feel that I have enough time anyway to work on curriculum building, planning and grading properly. • Keeping all classes even in terms of their grades/lessons time preparation and instructional time.	• Students were given the option of an A in Honors Physics or an array of B,C,D in AP Physics 1, they all chose B,C,D in AP Physics 1. • Communicate with parents when students are taking unnecesary risks: i.e. wanting to take and AP class when it is better to take an Honors Physics class first.

Principles of Authentic Multi-level Instruction

1. Authentic learning
2. Multiple levels
3. Scaffolding
4. Higher order thinking
5. Inclusive, heterogeneous grouping
6. Integrated skill learning
7. Focus on meaning and function
8. Multi-modal
9. Building on the strengths of children
10. Fostering respect
11. Student interests, choices, power, and voice
12. Collaborative learning
13. Reflection
14. Growth and effort-based evaluation

3 minutes of Questions & Answers



Acknowledgements

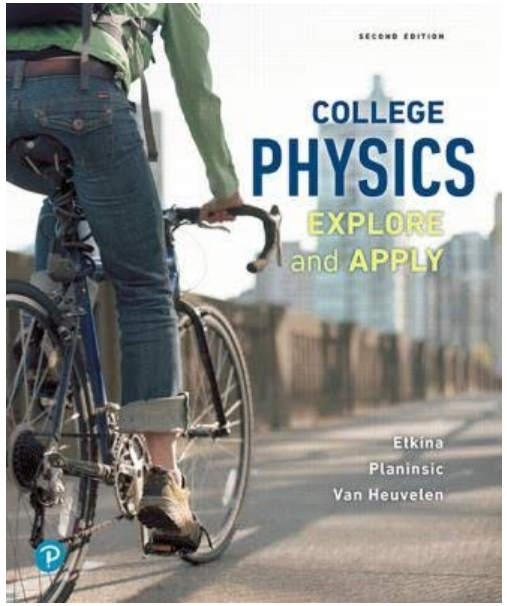
155 students

BOYD J. MICHAEL III TECHNICAL HIGH SCHOOL

WCPS
Washington County Public Schools

CSAAPT

pivot interactives

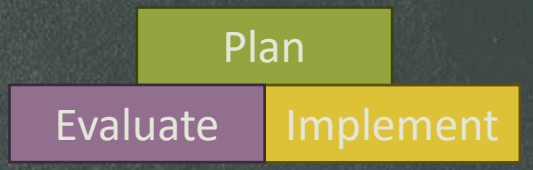


PUM

Takeaways

- Differentiation is a key component of instruction and requires more planning time.
- Working with the reading strength of students
- Curriculums and implementation are aligned.
- ISLE / PUM activities keep students engaged
- Mitigating challenges as they come
- Follow principles of multi-level classrooms

References



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