Implementing Dual Enrollment Honors Physics: Pedagogical Shift, Administrative Alignment, and the ISLE Framework

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Washington County Public School District
Boonsboro High School
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12 years of Dual Enrollment Washington County Public Schools and Hagerstown Community College (2025 data)

Rank	Community College	County/Area Served	Area Population	Total Enrollment	Enrollment Index
1	Allegany College of Maryland	Allegany County	66,848	3,144	4.70%
2	Hagerstown Community College	Washington County	158,322	6,695	4.23%
3	Howard Community College	Howard County	336,328	12,478	3.71%
4	Garrett College	Garrett County	28,370	869	3.06%
5	Frederick Community College	Frederick County	287,048	8,685	3.03%

Source: https://mhec.maryland.gov/publications/Documents/Research/AnnualReports/ENROLLMENT_BY_ACADEMIC_YEAR_FALL_2023_SPRING_2024_UNDUPLICATED.pdf

Community College Promise Scholarship (2018)

- Last-Dollar Tuition Coverage: Provides up to $5,000 annually for remaining tuition and mandatory fees after state and federal aid, eliminating financial barriers to postsecondary STEM pathways.
- Versatile Vocational Pathways: Applies to credit-bearing associate degrees, technical certificates, licensure sequences, and registered apprenticeship programs.
- Accessible Academic Criteria: Requires an unweighted high school GPA of 2.3+ (or 2.5 for current college coursework / GED equivalent), keeping options open for students with varied academic starting points.
- Broad Income Eligibility: Supports working and middle-class households with Adjusted Gross Income limits up to $100,000 (single parent) or $150,000 (two-parent).
- Local Workforce Alignment: Connects CTE high school graduates directly to their regional community college programs and local industry training.
- Seamless Bridge to Technical Careers: Complements hands-on, inquiry-based high school physics and engineering projects by funding the next step in technical and scientific education.

Source: https://mhec.maryland.gov/preparing/pages/financialaid/programdescriptions/prog_mdcommunitycollegepromisescholarship.aspx

Maryland Blueprint for Dual Enrollment Classes

- The Blueprint for Maryland's Future is not a single past event or short-term program; it is a 10-year statewide education reform law enacted in 2021 that phases in through 2031–2032.
- 10-Year Phased Plan: The law established an ongoing rollout overseen by the state's Accountability and Implementation Board (AIB). School districts (including WCPS) update their district implementation plans across multi-year cycles.
- Full-Scale Implementation: The College and Career Readiness (CCR) dual enrollment mandates—which require districts to cover tuition, fees, and books at zero cost for CCR-qualified students—became standard practice across all Maryland counties and remain the governing policy for WCPS and HCC.
- Target Benchmarks: Maryland's ongoing goal under the Blueprint is to have at least 45% of graduating high school students complete a postsecondary pathway (such as an AP course, CTE credential, or college dual enrollment course at HCC) before graduation.

Source:: https://blueprint.marylandpublicschools.org/wp-content/uploads/sites/20/2022/12/CCRReport_December2022_A.pdf

A "Pedagogical" Shift? Moving Toward Andragogy

Criteria	Traditional (Pedagogy)	Etkina ISLE (Guided Discovery)	Adult College (Andragogy)
Learner Role	Passive receiver of facts.	Knowledge builder like scientist.	Self-directed decision maker.
Method	Teacher gives formula first.	Students collect observational data.	Applied real-world workforce problems.
Motivation	Driven by passing tests.	Intrinsic scientific inquiry habits.	Career goals problem-centered focus.
Circuit Example	Memorize Ohm's law formula.	Build circuits to test.	Analyze real battery loads.

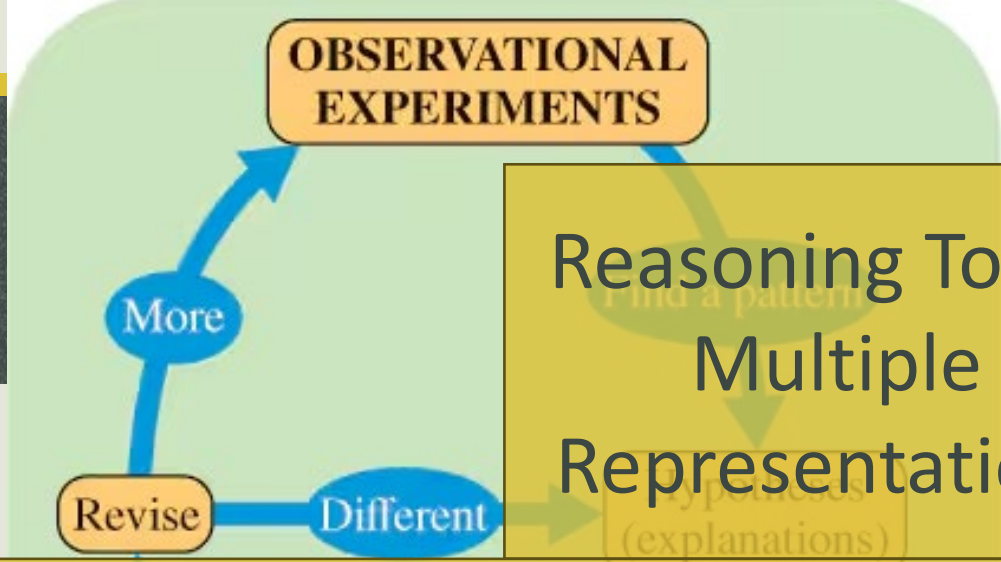
Source: Knowles, M. S. (1980). *The Modern Practice of Adult Education: From Pedagogy to Andragogy*. Cambridge Adult Education.

Aligning Missions: K–12 to Career Pathways

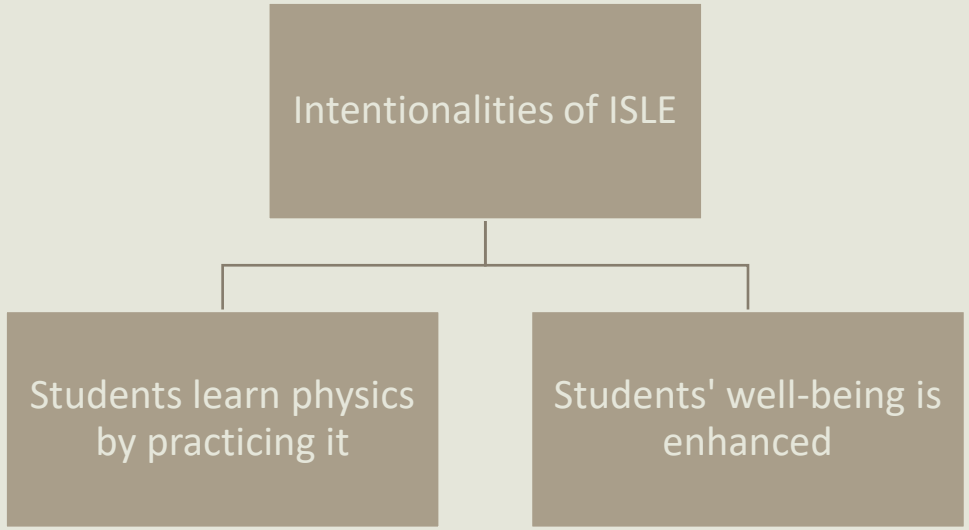
Alignment Dimension	High School Goal	Dual Enrollment (HCC PHS 103)	Community College / Career
Program Purpose	High school diploma completion.	College-credit physics foundation.	Transfer to 4-year Univ. or job/career.
Student Readiness	General independence habits built.	Rigorous conceptual inquiry mastery.	Professional/vocational skill readiness.
Instructional Model	Equation-focused reading lectures.	ISLE inquiry observational labs.	Applied career lab tasks.
System Alignment	District graduation standards met.	Shared rubrics and equipment.	Workforce and transfer accreditation.

Source: Conley, D. T. (2007). Redefining college readiness (Vol. 3). Educational Policy Improvement Center

Investigative Science Learning Environment - ISLE foundation



Reasoning Tools: Multiple Representations



Students work in small groups in a white board and share with the big group

Opportunities to improve their work

Students can retake their quizzes similar content different problems

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;

Implementation Challenges: Dual Enrollment Alignment

Challenge Area	Tillery Model (Standard DE)	Etkina ISLE Model (Honors/AP)	District Reality (WCPS)
Curricular Scope	Compresses massive content into Unit 1.	Spans detailed Chapters 1 through 7.	Paces learning at high speed.
Pedagogical Focus	Passive online platform reading tasks.	NGSS Science & Engineering Practices.	Lacks active scientific abilities practice.
Course Objective	Survey college physics course credit.	Deep inquiry and conceptual rigor.	Historically prepped students for AP.
Student Pipeline	Assumes college-level independent habits.	Designed for AP Physics 1.	Low enrollment and underprepared learners.

Initial sequence Requested vs Proposed to HCC

Tillery Textbook

- Unit 1: Science
- Unit 2: Motion
- Unit 3: Energy
- Unit 4: Heat and Temperature
- Unit 5: Wave motion and Sound
- Unit 6: Electricity
- Unit 7: Light

Etkina Textbook

- Chapter 1: Introducing Physics
- Chapter 2: Kinematics 1D
- Chapter 3: Newtonian Mechanics
- Chapter 4: Friction and Projectile Motion
- Chapter 6: Linear Momentum
- Chapter 7: Work and Energy
- Chapter 10: Vibrational Motion
- Chapter 17: Electric Charge, Force,
- Chapter 18: Electric Field
- Chapter 19: DC Circuits
- Chapter 22: Reflection and Refraction

AP Physics 1 vs Honors Physics (PHS-103) Dual Enrollment

AP Physics 1

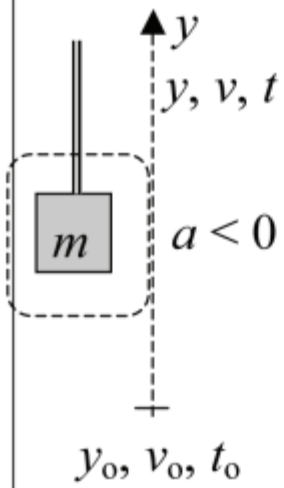
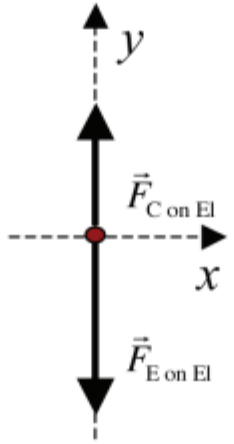
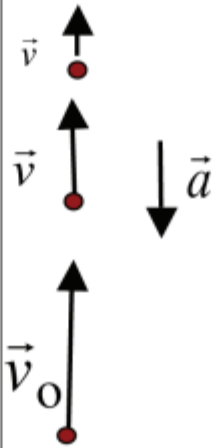
- Chapter 1: Introducing Physics
- Chapter 2: Kinematics 1D
- Chapter 3: Newtonian Mechanics
- Chapter 4: Friction and Projectile Motion
- Chapter 5: Circular Motion and Gravitation
- Chapter 6: Impulse & Linear Momentum
- Chapter 7: Work and Energy
- Chapter 8: Extended bodies at rest
- Chapter 9: Rotational Motion
- Chapter 10: Vibrational Motion
- Chapter 12: Gases
- Chapter 13: Static Fluids
- Chapter 14: Fluids in Motion

PHS-103 DE

- Chapter 1: Introducing Physics
- Chapter 2: Kinematics 1D
- Chapter 3: Newtonian Mechanics
- Chapter 4: Friction and Projectile Motion
- Chapter 6: Impulse & Linear Momentum
- Chapter 7: Work and Energy
- Chapter 10: Vibrational Motion
- Chapter 17: Electric Charge, Force,
- Chapter 18: Electric Field
- Chapter 19: DC Circuits
- Chapter 22: Reflection and Refraction

From ISLE to applied career labs

Multiple Representations and Problem-Solving skills

Word description	Sketch and system choice	Free-body diagram	Motion diagram	Newton's second law in component form
An elevator is slowing down on its way up.				$a_y = F_{net}/m$ $= \Sigma F_y / m$ or $a_y =$ $(F_{C\text{ on El}} - F_{E\text{ on El}})/m$

Source: Etkina, Van Heuvelen, & Rosengrant (2008), The College Board AP Physics Special Focus

Student Choice Final Chapter

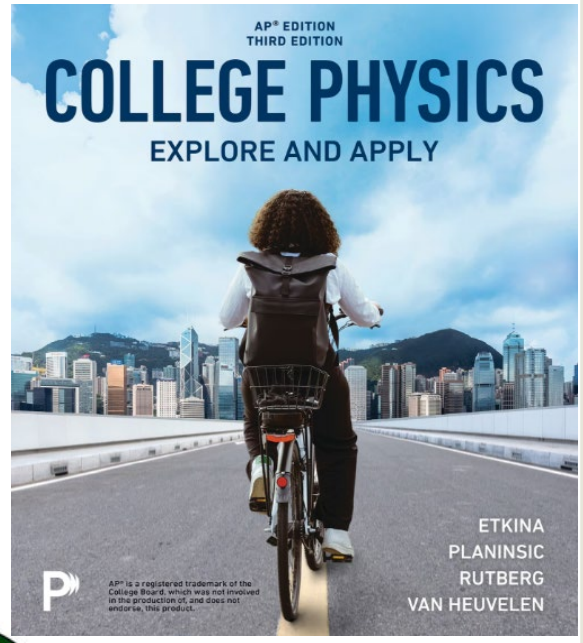
- ❑ Chapter 8: Extended Bodies at Rest
  - ➢ Evaluate torque and static stability for safe patient-lifting equipment loads
- ❑ Chapter 9: Rotational Motion
  - ➢ Calculate flywheel energy storage efficiency for industrial machinery gearboxes
- ❑ Chapter 11: Mechanical Waves
  - ➢ Model ultrasound wave transmission for medical imaging diagnostic accuracy
- ❑ Chapter 20: Magnetism
  - ➢ Analyze electromagnetic induction principles in hospital MRI magnetic shielding
- ❑ Chapter 26: Special Relativity
  - ➢ Calculate relativistic time dilation for commercial GPS satellite navigation

3 minutes of Questions & Answers

Acknowledgements

700 students

WCPS
Washington County Public Schools



HAGERSTOWN COMMUNITY COLLEGE

PUM

CSAAPT

Takeaways

- Institutional Alignment: Establish clear administrative goals across high school and college.
- Pedagogical Evolution: Scaffold students from pedagogy toward adult andragogy habits.
- Faculty Collaboration: Co-design common assessments and shared lab rubrics.
- Continuous Improvement: Share best practices to address implementation and pacing challenges.
- Student Impact: Evaluate student ability to apply scientific thinking beyond class.

References

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- Swann, J. (2026, August 14). *WCPS reports academic gains, record AP pass rate and career growth*. LocalNews1. https://localnews1.org/wcps-reports-academic-gains-record-ap-pass-rate-and-career-growth/
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Implementing Dual Enrollment Honors Physics: Pedagogical Shift, Administrative Alignment, and the ISLE Framework

Integrating secondary physics coursework with higher education expectations through Dual Enrollment (DE) models introduces distinct pedagogical and operational challenges. This presentation examines the alignment of a high school Honors Physics curriculum with Hagerstown Community College's (HCC) PHS 103 course, emphasizing the significant transition required when moving from a traditional reading- and equation-focused course to an inquiry-driven instructional model. Central to this implementation is the Investigative Science Learning Environment (ISLE) approach, which restructures the learning environment around observational, testing, and application experiments—deliberately avoiding premature mathematical derivations while building rigorous conceptual understanding. We detail specific scaffolding tools, such as Ranking Tasks and Equation Jeopardy, designed to reinforce unit analysis, problem categorization, and physical reasoning. Additionally, we address the practicalities of maintaining course integrity for future educators and health practitioners, managing the extensive teacher time required to build coherent, inquiry-based resources, and coordinating common assessment standards and laboratory equipment across district high schools.