

Reinventing Secondary School

An Investigation of a Polytechnic High School Model

Focused on Industry/Community-driven Design Projects

The 40th International Pupils' Attitudes Towards Technology Research
Conference

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PURDUE
UNIVERSITY

Polytechnic Institute

We are from the state of Indiana



Indiana

The Largest Public School System...



Indianapolis: Most Populated City

Indianapolis Public Schools (IPS)



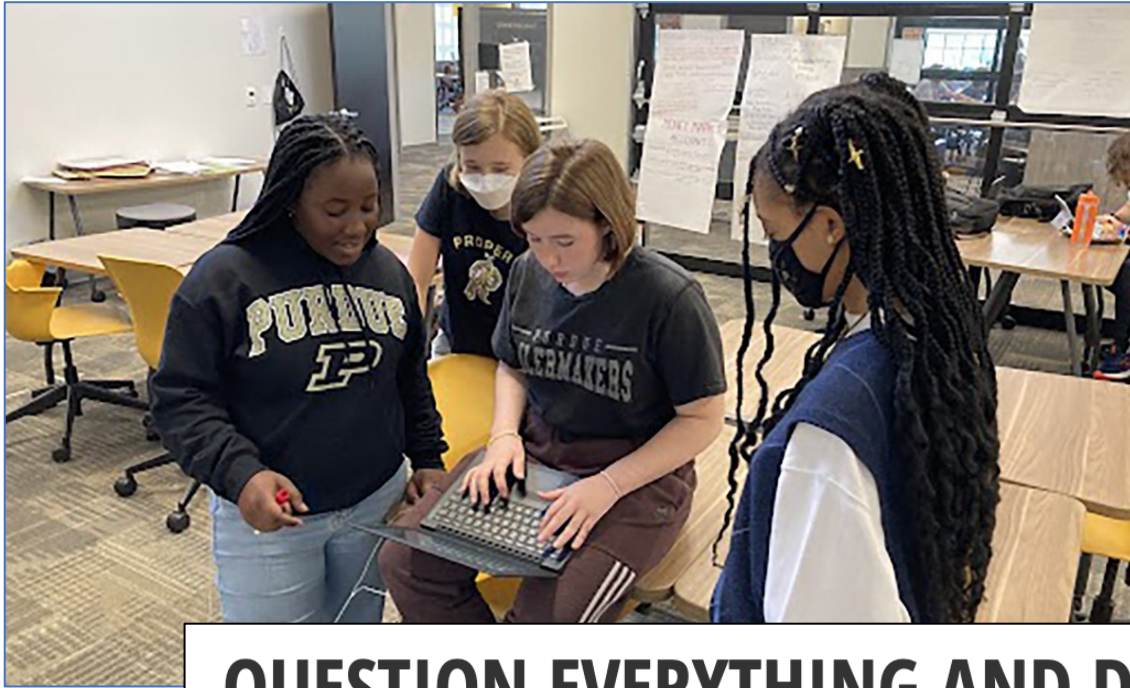
The Challenge...

“OF OVER 1100 [INDIANAPOLIS PUBLIC SCHOOL SENIORS]...ONLY 26 OF THEM QUALIFIED AND WERE ADMITTED TO PURDUE UNIVERSITY AND ONLY 12 OF THEM SHOWED UP ON CAMPUS.”

- MITCHELL DANIELS (FORMER PURDUE PRESIDENT)



Purdue Saw an Opportunity



Polytechnic High School

QUESTION EVERYTHING AND DREAM BIG!

We are innovative.

We are hands-on.

We are free.

We are Purdue Polytechnic High School and we are reinventing high school by breaking down the structure that students have had for years.



What is the polytechnic model?

A unique school - university collaboration, where students have ...

No bells, master schedule, no silos

6-week design cycle projects

Teachers as Coaches

Supplementary "dojos"

Passion Projects

Personal Learning/Design Time



What is the polytechnic model?

6-Week Design Cycles

Automotive Industry



How might we use emerging technologies to reshape an existing or future industry?

Aeronautic Industry



How might we move people or products farther, faster, cheaper, and more efficiently?

Racing Industry



How might we optimize a machine?

Construction Industry



How might we revitalize urban neighborhoods in our community?

Energy Industry



How might we power the world's innovation with great efficiency and access?

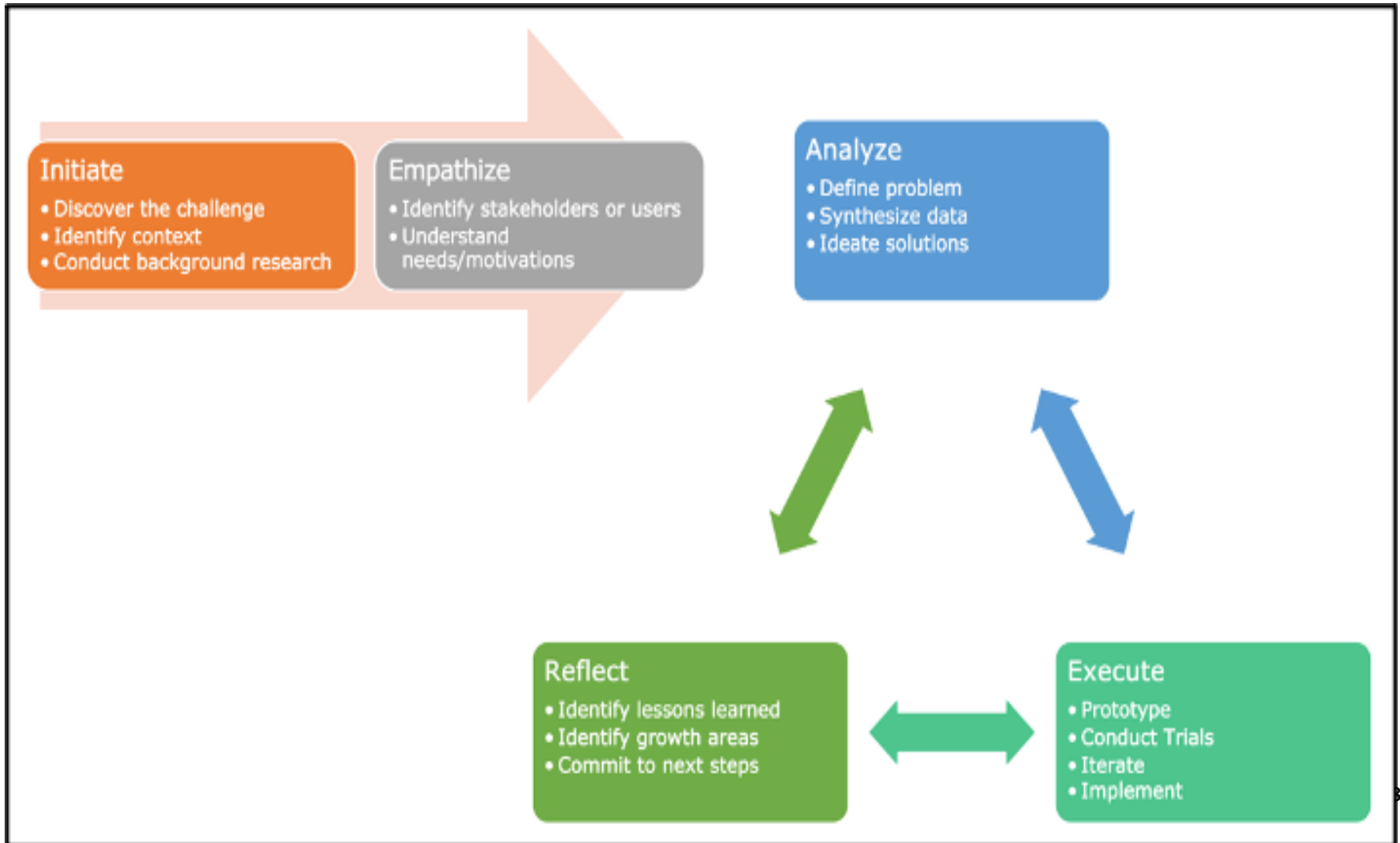
Healthcare Industry



How might we create or enhance products or services to help community members lead healthier lives?

What is the polytechnic model?

6-Week Design Cycle Process



Great Initial Results...

Of **110** graduating students in the first class, **40** chose to attend Purdue - **2.5x** **increase of students** from Indianapolis



But, what we didn't know...

What happens when students graduate & attend the traditional-siloed higher education institutions?

What are teachers experiences in this innovative polytechnic model?

Student Focus Groups/Surveys

Teacher Surveys

Student Data

Student confidence with 21st century skills

polite and kind to teammates

follow rules for team decision-making

Student struggles with 21st century skills

present information clearly, concisely, and logically

ability to come physically and mentally prepared each day



Student Data

All students felt:

Supported at the school

Some students did not feel:

Committed to the school

Accepted at the school

Apart of the school

Student Data

Students were most **excited** for...

Graduating

Being able to grow

Making new friends

Getting to know the advisors

Students were most **worried** about...

Not being able to graduate

Not being prepared enough to get assignments done

State standardized testing

Worries over career interest and related knowledge

Student Data

Students in the focus group struggled with ...

Academic Preparedness in mathematics

Personal Learning Time

Innovation for the sake of being innovative

Students in the focus group enjoyed...

More than one way to measure success

Passion Projects

No regrets

Teacher Data

Teachers were **confident** in their students' abilities to...

Be polite and kind to teammates

Improve their own work when given feedback

Acknowledge and respect other perspectives

Elaborate and improve ideas

Teachers were **not as confident** in their students' abilities to...

Use time and run meetings efficiently

Complete tasks without having to be reminded

Teacher Data

Teachers *feel that...*

Students are a part of this school

Students are accepted at this school

Students are supported at this school

Teachers *do not feel that...*

Students are comfortable at this school

Students are committed to this school

Teacher Data

Challenges that emerged:

The Curriculum – Always building the plane, while flying it – Burn out

Student Autonomy

Successes that emerged:

Student Learning and Growth

Educational Innovation

Building Meaningful Relationships

Recommendations and Discussions

It can be beneficial to study the **implementation of this school model overtime.**

There has been **some shifts toward “more traditional - siloed” educational approaches.**

What works and what doesn't

Educational innovation just to be innovative

Balance Between Rich Contexts & Content (What is Measured?)

Design Challenges have to be intentional – but the industry/community partners didn't know the desired learning outcomes

There are risks and rewards...

Increase in students attending collaborating university...



There are risks and rewards...

Autonomy - 12–13-year-olds with grand design challenges

Personal Learning/Design Time Purgatory – Student don't know, what they don't know, makes them stuck

Too much flexibility that makes turning in assignments in higher ed difficult



There are risks and rewards...

Fall behind in siloed higher education – traditional, worried they will fall behind, deadlines

Students wanted more regular math courses

If higher education stays the same, it will push back on the school model



There are risks and rewards...

Confident in teamwork,
communication, & problem
solving

Great stories and examples of
what students can do, but still
worried about how they would
score on a biology tests –
the Great things not
measured in standardized
tests)

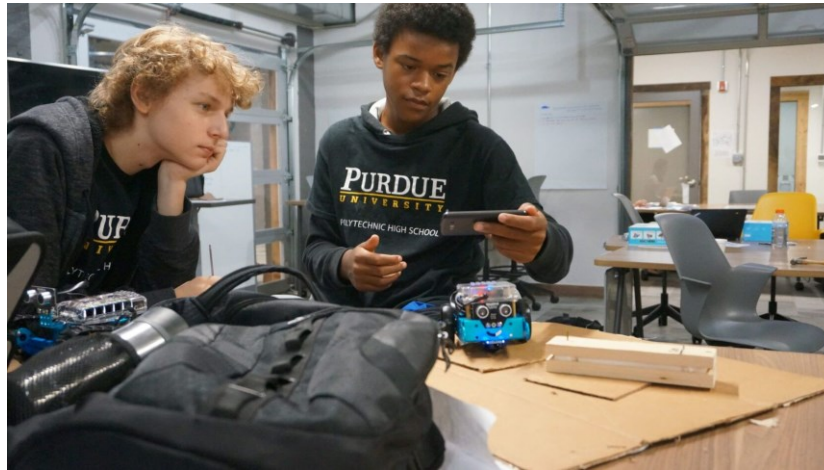


Conclusion

Students have no regrets

But there are challenges with reinventing school from a primary through post-secondary perspective

Research to find ways to improve not to stifle change



Thank you!

Question and comments?

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    / TechPurdue



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Appendix – Definitions

- **Polytechnic** - An educational model that “emphasizes an interdisciplinary campus environment, innovative instructional technologies, experiential and applied problem-based learning, applied research, disciplinary convergence, and community and global engagement, so that sustainable educational and economic progress can be demonstrated” (Mercer & Ponticell, 2012, p. 45).
- **Communication** - Involves communicating effectively “both face-to-face and across multiple media and for various purposes”, organizing thoughts, findings, data, and sharing them effectively through various media, including in writing and orally, and having the technological fluency “to select and use the right medium for their message” (Boss et al., 2013, p. 12).
- **Collaboration** - Working “effectively and respectfully with diverse groups to solve problems and accomplish a common goal. [Assuming] shared responsibility for completing tasks. Team efforts are “greater than the sum of their parts”; [teams] accomplish better results than could be done by individuals working alone” (Boss et al., 2013, p. 11-12).
- **Creativity** - Generating and improving on “original ideas”, generating and refining solutions to complex problems or tasks based on synthesis, analysis, and then combining or presenting the learned information in new and original ways. (Boss et al., 2013, p. 12,).
- **Belonging** - The common space between and among the aspects of commitment, connectedness, and engagement (Anderson-Butcher & Conroy, 2002)

Appendix – Likert Scale 21st Century Skills

5-Point Likert-Scale Questions (<i>Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree</i>)		
Based on my high school experience, I am confident in my ability to...		
Collaboration	Q1 be polite and kind to teammates	
	Q2 acknowledge and respect other perspectives	
	Q3 follow rules for team meetings	
	Q4 make sure all team members' ideas are equally valued	
	Q5 <u>offer assistance to</u> others in their work when needed	
	Q6 improve my own work when given feedback	
	Q7 use appropriate body language when presenting	
	Q8 come physically and mentally prepared each day	
	Q9 follow rules for team decision-making	
Communication	Q10 use time, and run meetings, efficiently	
	Q11 organize information well	
	Q12 track our team's progress toward goals and deadlines	
	Q13 complete tasks without having to be reminded	
Creativity/Innovation	Q14 present all information clearly, concisely, and logically	
	Q15 Understand how knowledge or insights might transfer to other situations or contexts	
	Q16 Find sources of information and inspiration when others do not	
	Q17 Help the team solve problems and manage conflicts	
	Q18 Adapt a communication style appropriate for the purpose, task, or audience	
Belonging/Inclusion	Q19 Elaborate and improve on ideas	
	4-Point Likert-Scale Questions (<i><u>NO!</u>, no, yes, YES!</i>)	
	Q20 I feel comfortable at this school.	
	Q21 I am a part of this school.	
	Q22 I am committed to this school.	
	Q23 I am supported at this school.	
	Q24 I am accepted at this school.	

Appendix – Likert Scale Belonging

	NO!	No	Yes	YES!
I feel comfortable at the program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am a part of the program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am committed to the program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am supported <u>at</u> the program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am accepted <u>at</u> the program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Appendix – Teacher open-ended questions

- The open-ended questions in the **pre-survey** asked:

What are you most worried about for this school year?

what are you most excited about for this school year?

- The **post-survey** questions asked teachers/coaches:

What did you like most about this school year?

How would you describe this school to other teachers and what would you feel the need to tell them?

Reflecting on your experience this school year, what new challenges did you encounter?

Reflecting on your experience, what could make a student a good fit for this school?

Appendix – Student open-ended questions

- The open-ended questions in the **pre-survey** asked:

What are you most worried about for this school year?

what are you most excited about for this school year?