

#### STATE COMMITTEE ON COMPUTER SCIENCE

Making Ohio a National Leader in Computer Science Education

**Organizational Meeting** 

Committee Facilitator Kelly Gaier Evans - Battelle

Chair: Mike Duffey, Ohio Department of Higher Education

Vice Chair: John Wiseman, Ohio Department of Education

February 16, 2022 from 9:30-12:30 p.m.

# Approval of Minutes

#### Chair, Mike Duffey

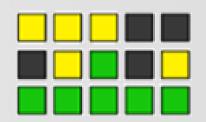
- November 17, 2021
- December 15, 2021

#### Need:

- Motion to approve minutes
- Second

# Community Building

What is your favorite game? (board games, video games, card games)?



What's an unintended consequence that you have seen occur?
How could it have been prevented?



### Our work thus far...

November 2021 State of CS in Ohio

December 2021 Challenges and Root Causes

January 2022 Postponed



# The Five Why's

Define t	he	Problem		
<b>↓</b>				
Why?	$\rightarrow$	Answer	$\rightarrow$	Recommendation
	~			
Why?	$\rightarrow$	Answer	$\rightarrow$	Recommendation
	~			
Why?	$\rightarrow$	Answer	$\rightarrow$	Recommendation
	~			
Why?	$\rightarrow$	Answer	$\rightarrow$	Recommendation
	~			
Root Why?	<b>→</b>	Root Answer	$\rightarrow$	Recommendation



November & December

February 16<sup>th</sup> and March 9<sup>th</sup>

March 30<sup>th</sup> and April 20<sup>th</sup> April 11<sup>th</sup> and June 1<sup>st</sup>

June 1st - 2nd

- Our charge
- State of CS
- Surfaced opportunities and challenges
- Root cause analysis of challenges



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- Discuss/plan recs for statewide challenges preventing districts from offering CS
- · HW: feedback
- All recs revised & shared
- Discussion to include or not to include in state plan



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- Discuss/plan recs for challenges in the K-12 to workforce CS pipeline.
- Discuss/plan recs on how to measure and report on postsecondary CS education
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- Discuss/plan recs on how to measure and report on postsecondary CS education
- HW: feedback
- All recs revised & shared
- Discussion to include or not to include in state plan

- Retreat
- Review entire set of recs
- revise drafted state plan



STATE COMMITTEE ON COMPUTER SCIENCE

## Our work today

9:30 -10:00 a.m. Welcome and recap

- Approval of minutes (both Nov and Dec)
- Community building
- Frame our Time Together and overview of the agenda
- Recap the charge and our progress (data, challenges)

10:00-11:00 a.m. First Challenge: There is widespread disagreement and confusion on what Computer Science is and is not.

- How does Ohio operationalize CS education in K-12 currently?
- What recommendations does this committee have for reporting on CS access and participation?

11:00-11:10 a.m. Coffee and stretch break

11:10-12:20 Challenges that prevent the state from becoming a leader in Computer

Science education | Discussing Recommendations

12:20-12:30 Homework and Wrap up



## Our Charge – HB 110 - continued

- (D) Within the plan, the committee ... shall include all of the following:
- (1) An examination of the challenges that prevent school districts from offering computer science courses;
- (2) A requirement that the department of education collect any data regarding computer science courses offered by school districts and school buildings operated by school districts, including the names of the courses and whether the courses were developed using the standards and model curriculum ...and post the collected data on its web site.
- (3) A requirement that the committee determine the best ways to compile data on computer science courses, teachers, and undergraduate students studying computer science in universities.
- (4) Any findings the committee determines appropriate based on its consideration of the topics described in division (B) of this section.

# Our Charge – HB 110 – the state budget

We have a unique opportunity to help make Ohio a national leader in computer science education and workforce pipeline.

- (1) Best practices and challenges associated with the implementation of primary and secondary computer science curriculum in this state;
- (2) Demographic data for students who receive instruction in computer science;
- (3) Benchmarks to create a sustainable supply of teachers certified to provide instruction in computer science;
- (4) Best practices to form public and private partnerships for funding, mentoring, and internships for teachers providing instruction in computer science;
- (5) Requiring all students to complete a computer science course prior to high school graduation;
- (6) Establishing a work-based learning pilot program that includes high schools, universities, and local industry and permits the department and the chancellor to develop pathways to align computer science education in the state with the state's workforce needs;
- (7) Any other topic determined appropriate by the committee

HB 110: <a href="https://ohiohouse.gov/legislation/134/hb110">https://ohiohouse.gov/legislation/134/hb110</a> (Pages 703-705)



#### **Norms**

- We all have different filters, share yours
- Always assume positive intent
- Be curious and ask questions
- Be here now
- Communicative respectfully
- Safe space to contribute ideas (disagree w/content not the person)
- Treat everyone with courtesy and respect
- Embrace data, where it is and isn't available
- Come to meetings fully prepared which includes any homework or review of materials sent prior\*\*



# Identified challenges







```
Computer Science taxonomy/Naming issue is it Digital?
   * Workforce/Career Pathways
Not driving naming
      * K. 12 + higher Ed Disagreement
      * CS defined differently limited
** reveryone needs Digital lit
 Why?

| Branding / Identification - Students identify

| Chardina
        2. Limited UnderStanding
        3. Lack of State Leader Ship Educating/Communicating
H. We don't know how to
              Identify/Explain xinterms of careers x Disciplines
           A. Building Culture
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CS IS NOT PROMOTED IN HAYS TO IMPRIEST STUDENTS (5 DOCS NOT HAVE " IT " PACTER.

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12 BETC THEY DO NOT KNOW WHAT IT IS

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Gregources Action:



2 Relevant CS Ed Why? students | \* Alignment w/others

Subjects

\* higher ed/workforce Dev 1. What is Relevant? Who defines/Provides. Updated to Students Careers -Industry not Disconnected from Students heedin know -exfort -history of theory then pronctice Muny career opps in multi -Ed Foundation Disciplina -Students here -Not tracking
Alums Ca nontrad Ed -Geek Factor needs to Change Shisted to Regulation

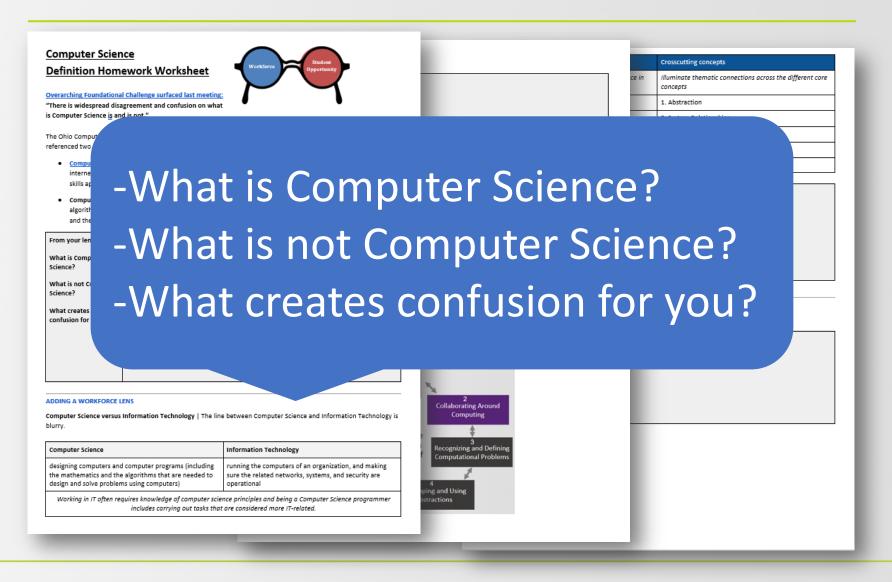


# Overarching Foundational Challenge:

There is widespread disagreement and confusion on what is Computer Science is and is not.



#### The homework





#### What we heard the homework

#### High level – a **shared understanding** of next steps:

- Instead of adjusting the language in statute for Computer Science, the committee should agree on a common approach to operationalizing computer science when developing their concrete recommendations for the state.
- Computer Science is often confused with IT because there is overlap between the knowledge base required for both. The committee should extract the key IT concepts that are foundational to Computer Science.
- Computer science is broad and when the committee talks about challenges preventing school districts from offering computer science courses - there has to be clarity on which courses are reported as computer science to help inform recommendations more thoughtfully.

#### What we heard the homework

#### High level – a **shared lens for operationalizing** computer science:

- Computer science is structured problem solving and the core concepts around troubleshooting, logical reasoning, computational thinking and decision making. There are foundational skills that will help students become critical thinkers as adults and transition from K-12 to postsecondary to workforce.
- Computer science is a logical way to process information and data to solve problems through writing algorithms or debugging algorithms. It is focused on the design and development rather than the learning of basic computer and technology skills.

Seeking clarity....

# Which courses are reported as computer science?



Ohio Dept of Education sets course codes in a common system.

Schools are required to choose a course code from that system describing the course they are offering.



#### What are the Computer Science course options?

- The Ohio System is called EMIS.
- The EMIS manual has three tables that relate to Technology, Computer Science, and Career Tech Ed – Information Technology (CTE IT)
  - Computer Science codes are on Table 16
  - Technology codes are on Table 18
  - CTE IT Codes are on Table 29

#### **NOTES**

- Legally, schools are not required to teach or use the Ohio CS standards.
- Some courses in EMIS explicitly call out a connection to the CS standards.



# K-12 Technology Section – Ohio Courses in EMIS Table 16 | Computer Science Codes

Techno	logy Section		
Table 16	Computer Science Codes (29xxxx)		
Table 16. Computer Science Codes (29xxxx)  Subject Code  Description  Suggested Subject Area for Credit  The following are computer science courses in accordance with Ohio Revised Code §3319.236. The following courses do not earn high school technology credit. This instruction may also be provided by a teacher to multiple groups of students rather than in a self-contained classroom setting. The K-8 content across Ohio's Technology standards defines achievement in meeting the No Child Left Behind 8th Grade Technology Literacy Requirement. Instruction is most effective when integrated with curricular components of other academic content areas.    Computer Science K-8   Includes content in the appropriate grade range portion of Ohio's   N/A			
Code		Subject	Area (for
		Area for	proper cert)
		Credit	
The follo	owing are computer science courses in accordance with Ohio Revised	d Code §331	9.236. The fol-
lowing o	ourses do not earn high school technology credit. This instruction may	ilso be provid	led by a teacher
to multir	ole groups of students rather than in a self-contained classroom setti	ng. The K-8	content across
Ohio's T	echnology standards defines achievement in meeting the No Child Lef	Behind 8th	Grade Technol
ogy Lite	racy Requirement. Instruction is most effective when integrated wit	h curricular	components of
other ace	demic content areas		1
	Computer Science K-8	N/A	_
290245		1471	_
270210	Lagraina Standards for Computer Science		

Computer Science codes include computer/multimedia literacy, software, Internet, systems/netwo	orleing and
programming. All courses should be based on advanced topics aligned with the 9-12 section o	f the Ohio
Technology academic content standards. Credit cannot be given for concepts below 9th 12th a	erada.
Technology academic content standards. Credit cannot be given for concepts below 7th 12th g	rude.

Subject Code	Description	Suggested Subject Area for Credit	Core Subject Area (for proper cert)
290180	Computer ServiceRepair This course includes configuration, troubleshooting and repair of network hardware, clients and peripherals. In addition, content should	TEC	_
	include installation of operating systems including updates, computer security and customer service. Course includes troubleshooting, repair, system/network reconfiguration, help desk practices, etc.	TEC	
299999	Other Computer Science Technolog:  A high school level course that addresses content from the 9-12 section of Ohio's Learning Standards for Computer Science and is different in scope from any of the other Subject Codes described above. A course that is given for High School credit to be applied to	TEC	_
	ward the diploma, but that is different in scope from any of the other SUBJECT CODES described above.		

Subject Code	Description	Suggested Subject Area for Credit	Core Subject Area (for proper cert)
290250	Computer Science Principles In this course, students develop an understanding of how computing is used to solve problems and enable innovation across fields and how these solutions can impact society. Students explore using computational thinking skills and tools to solve problems and create artifacts. Effective communication and collaboration skills are developed as students work individually and in group explorations. This course is designed to develop an understanding of the usage and impact of computer science as an innovative computational tool for solving problems in many fields. Effective communication and collaboration	TEC <del>, MTH</del>	_
	skills are developed as students individually and in group explora- tions solve simulations of real world problems. The course focuses on the importance of solving problems and the impacts of those so- lutions to their community, society, and the world.		
290310	Computer Science with In-Depth Study.A  This course addresses computer science topics that include problem solving strategies, organization of data, algorithmic thinking and programming, analysis of potential solutions and the impacts of computing. The course provides the opportunity for a more in-depth study of selected computer science content. The study of programming methodology with an emphasis on problem solving and algorithm development. Also includes study of data structures and abstraction, but not to the extent as covered in Computer Science AB.	TEC <del>, MTH</del>	_
290320	Computer Science AB Industrial topics of Computer Science A, as well as a more formal and more in depth study of algorithms, data structures and data abstraction.	TEC, MTH	_
290325	Specific Topics in Computer Science This course provides a focused examination of specific computer science topics (e.g., cybersecurity, robotics, data science).	TEC	_
290170	Networking In this course, students understand the concepts and use of network servers and devices (e.g., host, firewall, router, switch). Students understand the advantages and disadvantages of network models (e.g., peer-peer, client-server). Content addresses network design fundamentals including network type (e.g., LAN, WAN, MAN). Students also learn the application of network topologies (e.g., Star, bus, hybrid). At an advanced level, students design and build simple networks, understand server virtualization and network security. Course includes operating systems, printers/print servers, network configu	TEC	



# K-12 Technology Section – Ohio Courses in EMIS Table 16 | Computer Science Codes

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Table 16. Computer Science Codes (29xxxx)					Area for Credit	proper cert)
Subject Code Description	Subject	Core Subject Area (for		Computer Science Principles In this course, students develop an understanding of how computing	TEC <del>, MTH</del>	_
	Area for Credit	proper cert)		is used to solve problems and enable innovation across fields and how these solutions can impact society. Students explore using computa-		

#### Computer Science K-8 (290245)

Includes content in the appropriate grade range portion of Ohio's Learning Standards for Computer Science.

29031	ting. The course	provides the opportunity	for a more in-depth stu
	of selected con	nouter science content.	he study of programmi

#### Computer Repair (290180)

This course includes configuration, troubleshooting and repair of network hardware, clients and peripherals. In addition, content should include installation of operating systems including updates, computer security and customer service.



# K-12 Technology Section – Ohio Courses in EMIS Table 18 Technology Education Codes

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101355   mode and profile   mode seasons   101356   mode and profile   mode seasons   mode and profile   mode		work in roboti								mathematics and other school subjects in authentic situations. This		
Second Computer Note   Decision of process of the control of the	101255				290035							
Security of the properties o			<del>290165</del>	Course sucura merane								
Robbits   Robb				m total and make an amagine make			290130					
Computer State   Comp										erate citizens.		
Computer Set   This course   dent work in robotics   technology application   Experiences with computer   Experi	1										TEC	_
1	1				290040		290075		101700			
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Computer/Multimedia Literation							Tachna			Other Technology	TEC	_
This Course focuses on advant Ohio's Learning Standards for Technology and is different in Scope from any of the other Subject Codes described above.  Instruction that include Standards for Technology on the object Codes described above. Standards for Technology on the object Codes described above.  Instruction focuse design process to solve design process to solve design process to solve their own role in tech their own role in the structure. The following includes technology detaction courses (10009) the own role in the o				world are connected a								_
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design process to solve dents examine the relation of their own role in tech their own role in the r			102200	ogy.Instruction focuse		Technology-Productivity Tool	and bio-	related/chemical fields. These activ	build str	uctures on site. In particular courses that are part of the construction t	echnology sy	stems focus on
dents examine the relation of their own role in tech their own role in the r			102290			This Course focuses on advance						
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15 HOST CHECTIVE WHEIT HIGGIGU				content standards for t		is most effective when integrate_		, serence, miguige arts, so	lated/che	emical fields.		



#### STATE COMMITTEE ON COMPUTER SCIENCE

# K-12 Technology Section – Ohio Courses in EMIS Table 18 Technology Education Codes

	Description		n Codes (10xxxx)  Description	Subject Code	Description	Subject Code	Description	Subject Code	Description	Subject Area for Credit	Core Subject Area (for proper cert)
		Couc							Technology Education	TEC	
					Technological Literacy 7-8		Technology-Communication Too		Comprehensive action-based courses concerned with the evolution,		i ['
The fol	lowing courses		W. L. C. tr. D L.		Instruction that includes content		This Course focuses on advanced	102300	utilization, and significance of technology and its impact on industry,		ı l
	er to multiple g		Web-Ssite Developme		Standards for Technology,acad	200110	Ohio's Learning Standards for #Te		including its organization, personnel, systems, techniques, resources,		ı l
	Ohio's Technol		This course includes	1	Lagra Instruction facusas on skill	290110	ards including identifying purpos		products, and socio cultural aspects.		ı l
			create dynamic, usable	1107795	- 69		strategy. Instruction is most effect		Foundations of Technology	TEC	_
-I echne	logy Literacy F		using common design		design process to solve problem		other academic content areas		Prepares students to understand and apply technological concepts and		

#### **Computer Programming (290200)**

This course includes the study and use of programming languages (e.g., C++, C#, Java, Python).

course can ais 1015.	oo and use of systems to		recumology, Lacerronic resource	The study of industrial-technical problems, including provisions for	
Computer Se	dent work in robotics r	Instruction that Includes conten	This Course focuses on advanced 1017	700 individual or group investigations of problems and opportunities to	
This course i	technology application	ing Standards for Technology,	Ohio's Learning Standards for ‡Te	evaluate their solutions by designing, constructing, and testing prod-	

#### Computer/Multimedia Literacy 4-6 (290040)

Instruction that includes content in the 4-6 portion of Ohio's Learning Standards for Technology, focusing on the use of educational technology for learning. Students develop skills and knowledge for using digital learning tools to access, create, evaluate, apply and communicate ideas and information.

design process to solve dents examine the relatheir own role in tech content standards for t

This Course focuses on advance
Learning Standards for Technol
increase personal productivity a
is most effective when integrate.

general technology courses at the middle and Prep and Pathways courses at the high selv with mathematics, science, language arts, so

the structure. The following includes technology education courses (10xxxx) that focus on technology systems for the construction, manufacturing, communication, energy/power/transportation, and bio-related/chemical fields.



STATE COMMITTEE ON COMPUTER SCIENCE

## Career Tech Ed – Ohio Courses in EMIS Table 29 Information Technology Codes

	. Career Field 12 Description
	3-D Techniques Students will us
	l .
145120	source programn or standalone en
	visual production
	test three dimens
	Animation
	Students will use
	production of an
	and storyboard a
145115	dents will use co
	ware to create fir
	They will accom
	voice, backgrou

multiple scenes.

Subject	Description			I
Code		Subject Code	Description	
	Information Technol			l
	The capstone course		Database Applications	l
	knowledge, attitudes		Students will use develop	l
	Technology program		tabase systems theory, as	ı
145015	Capstones often inclu		will learn to import and	l
143013	ties that occur both in	145085	make advanced queries,	l
	the school and through		dents will develop macro	ſ
	bine classroom learnii		ing menu-driven applic	l
	delivered through a vi		modeling, diagraming, q	ı
145020	tive education or inter		veloped	ı
145020	Computer and Mobil		Design Techniques	l
	Students will learn to variety of commercial		Students will learn techni	l
	these applications, mo	145095	through use of digital ca	l
	to handle user issues.		accomplish this, they will	ı
	vice in professional		cluding layering, color co	L
	groups, and corporate		current commercial and c	ı
	Computer Hardware		Game Design	ı
	Students will learn to i		This course will prepare s commercial and open so	14
	ware systems. They w	145090	will learn industry stand	ı
145025	and learn techniques	145090	write programs that inte	ı
	Communication skills		stances. Students will lea	l
	tions will be emphasiz		sion detection, game phy	ŀ
	Computer Software		Information Technolog	
	Students will apply k		This first course in the IT	ı
	source operating system		with a working knowleds	ı
145030	vices. Students will in	145005	necessary for work and c	
	and using remote assi		will learn safety, security	ı
145030	and troubleshoot oper		networking. Students wi	ŀ
	security, and operating		computer hardware and c	l
	Creating and Editing		Interactive Application	ı
	Students will learn to c		Students will learn skills	l
145100	projects, web sites, an	145125	ing components for web	l
	strate methods of creat		ing commercial and open	ı
	cial and open source s		will master web interactive	ı
	Database Administra		Multimedia and Image	ŀ
	Students will learn at		Students will apply princi	ı
	rency security, reliabil		dures, and multimedia to	ı
145080	volved in the administ	145105	and export graphics for v	l
	Students will design, a ity. Knowledge and sl		will address issues related	l
	houses, and data minir		security. Students will u	
	nouses, and data minii	1	languages, programs, and	ı

Subject Code	Description		Description			
Code		Code				
145035	Networking Students will install, and peripherals. Stuc model, network tope networks, know how figure the equipment and usage of network Network Managem Students will perfort configuring network	145055	Routing and Swite Student will learn to routers and switches standards and comp communications ac shoot the routing pu Local Area Network Systems Analysis a Students will learn develop an understa	the frees. Someoneross roces (V) and I the t		
145045	by IEEE standards model, students will and develop knowk will demonstrate ma less networking, T(	145075	develop an understandin, ware development. Stud gramming languages an development. A variety applications, and tools w Video and Sound			
145040	shooting.  Network Operating Students will perforing support for users sional offices, small corporate informatic configure, and update	145110	Students will create tribution in tradition produce, edit, and scripts and storybos sounds using micro and edit to achieve animation and grap	nal ar		
145050	ing systems.  Network Security This course will add Students will learn hardware, and netw theory, cryptograph	145070	Visual Programm Students will create gramming techniquations. Students will web applications, open source progra	146		
145065	curity, and methods  Object Oriented Pt Students will learn t that have data fields Students will imple method, inheritance, serialization. A varie applications will be	145010	Web Design Students will learn suing an in-depth (HTML) and Casc such as FTP, TCP create a website w graphics, hypertext Integrated Produs	146		
145060	Programming In this course studen active applications. quence, selection, solutions to problen ence in using commo	145999	Students will engagies to imagine and students will be into high-paying career ical systems; inven	146		

ence in using commo

	Subject	Description			Suggested	Core Subject	ct
	Code				Subject	Area (for	
					Area for	proper cert	)
		Danting and Cuite	him a		Credit CTA		-11
install, ls. Stuc rk tope w how ipmen	145055	routers and switche standards and comp communications ac	the functions. Stude onents arross mul	ions, characteristics, and operations of nts will learn about wireless network and the role that routers play in enabling tiple networks. Students will trouble- tudents will examine the use of Virtual	CIA	_	
etwor							ш
Local Area Networks (VLANs) to create logically separate network systems Analysis and Design Students will learn the theory and practice of software testing as develop an understanding of the analysis and design phases of so ware development. Students will effectively use appropriate pr gramming languages and software patterns to improve softwa development. A variety of commercial and open source program applications, and tools will be used.					CTA	_	
ng, T(	145110	tribution in tradition produce, edit, and scripts and storybo	al and no	onal video and audio productions for dis- cew media channels. Students will plan, media products. Students will develop Description	CTA	_	Sug
, small ormatic d upda		sounds using micro and edit to achieve animation and grap	Code				Ar C
		Visual Programm		Cybersecurity			CTA
urity		Students will create		Students will learn the components of cyb	ersecurity and	the role each	

bject Code	Description	Suggested Subject Area for Credit	Core Subject Area (for proper cert)
	Cybersecurity Students will learn the components of cybersecurity and the role each	CTA	_
	plays in preventing, detecting and mitigating vulnerabilities and at-		
6005	tacks. Components include the security of the network infrastructure, security of the systems, and the prevention, detection, and mitigation		
	of common vulnerabilities and attacks. Throughout this course, stu-		
	dents will examine and implement security safeguards for desktop,		
	network, and application security.		
	Cybersecurity Defense and Reinforcement Students will learn the process of systematic defense for information	CTA	_
C010	technology systems. They will apply knowledge and skills required		
6010	to secure network resources including infrastructure, operating sys-		
	tems, data, and applications. Students will apply the knowledge of		
	disaster recovery and business continuity.		
	Cybersecurity Testing and Response Students will apply the skills of systematic testing and planned re-	CTA	_
	sponse to mitigate security concerns in information technology sys-		
6015	tems. They will describe the need for security, identify and explain		
	security risks, and implement security safeguards. Students will man-		
	age threats, deploy countermeasures, and establish strategies to pro-		
	tect business information using risk and incident management.		



and mechanical engtion systems; and world's most pressi

# Career Tech Ed – Ohio Courses in EMIS Table 29 Information Technology Codes

Career Field 12 Description	Subject Code	Description	Subject Code	Description	Subject Code	Description	Subject Code	Description	Subject	Core Subject Area (for proper cert)	
						Networking		Routing and Switching	CTA	_	

#### **Information Technology** (145005)

This first course in the IT career field is designed to provide students with a working knowledge of computer concepts and essential skills necessary for work and communication in today's society. Students will learn safety, security, and ethical issues in computing and social networking. Students will also learn about input/output systems, computer hardware and operating systems, and office applications.

Communication skills	stances. Students will lea		minimum and grap [			
	stances. Students will lea	ing eveteme	X22 - 1 D	Cyborcoourity	CTA	
tions will be emphasiz	along districtions around along	mg systems.	Visual Programm	Cybersecurity	CTA	
 tions will be emphasiz	sion detection, game phy	Network Security	0.1.2		I	
Computer Software	To Comment of The desired		Students will create	Students will learn the components of cybersecurity and the role each		
Comparer Soremare	Information Technolog	This course will add			I	
Students will apply k	700 1 C 4 1 700		 gramming techniqu	plays in preventing, detecting and mitigating vulnerabilities and at-		I

#### **Cybersecurity Defense and Reinforcement** (146010)

Students will learn the process of systematic defense for information technology systems.

They will apply knowledge and skills required to secure network resources including infrastructure, operating systems, data, and applications. Students will apply the knowledge of disaster recovery and business continuity.

world's most press	tect business information using risk and incident management.		

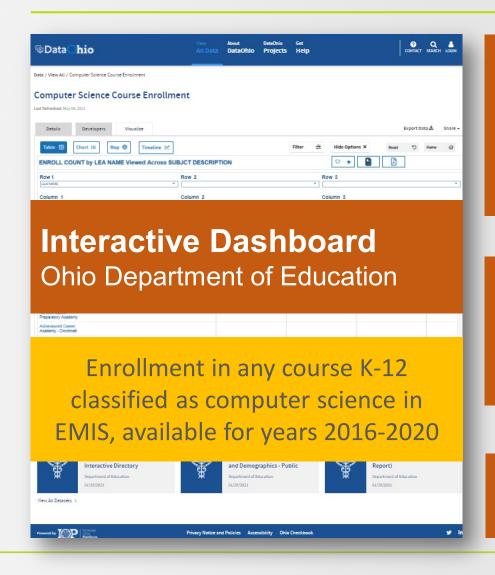


# Seeking clarity....

How can we see access and participation in k-12 Computer Science across Ohio?



## Ohio's Computer Science Data Dashboard



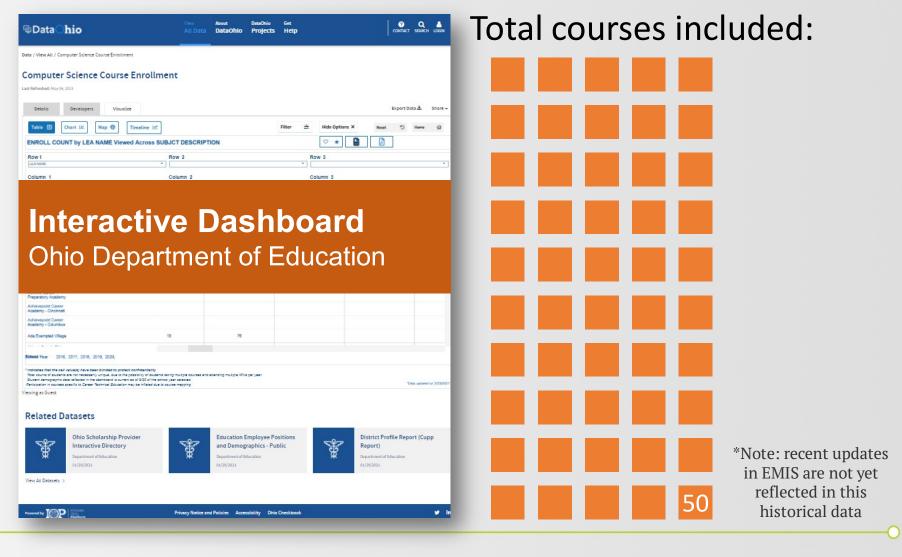
All courses the Ohio Department of Education has classified as computer science based on the definition of Computer Science identified in legislation for Ohio<sup>2</sup>.

Such classification is made by Ohio Department of Education content specialists alongside external stakeholders.

Computer Science course codes were updated this fall.



#### Ohio's Data Dashboard





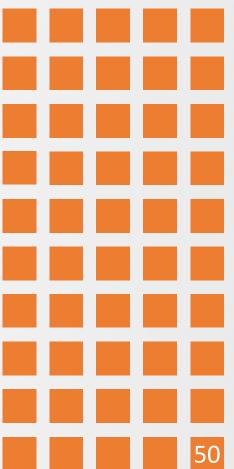


Table 16. Computer Science Codes (29xxxx)	Course code	Enrollment SY 2020
Networking	290170	145
Computer Repair (Revised in 2021 - now Computer Service)	290180	148
Computer Science Principles (Revised in 2021 - now Computer Science)	290250	1,696
Computer Science A (Revised in 2021 - now Computer Science with in-depth Study)	290310	1,859
Computer Science AB (Revised in 2021 - No longer offering)	290320	219
Other Computer Technology (Revised in 2021 - now Other Computer		
Science)	299999	11,110



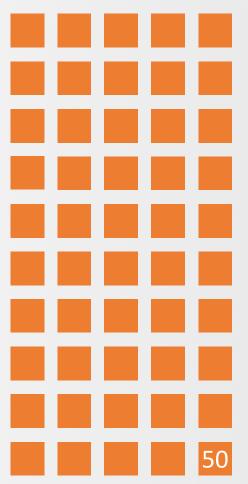


Table 18. Technology Education Codes(29xxxx)	Course code	Enrollment SY 2020
Computer/Multimedia Literacy K-3	290035	73,700
Computer/Multimedia Literacy 4-6	290040	77,544
Computer/Multimedia Literacy 7-8	290045	50,821
Computer/Multimedia Literacy	290050	11,689
Technology: Electronic Resources	290075	462
Technology-Productivity Tools	290100	22,656
Technology-Communication Tools	290110	3,778
Technology-Problem-Solving Tools	290120	2,666
Internet Searching	290130	503
Technology and Ethics	290140	499
Computer Graphics	290150	3,036
Web Site Development	290160	1,602
Computer Science (Revised in 2021 to "Computer Programming")	290200	6,037
Advanced Web Site Development (Revised in 2021 - No longer offering)	290165	39



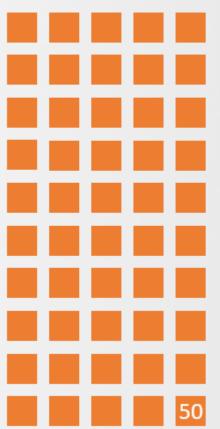


Table 29. Career Field 12: Information Technology Codes (14xxxx)	Course code	Enrollment SY 2020
Information Technology	145005	25,037
Web Design	145010	3,511
Computer and Mobile Applications	145020	695
Computer Hardware	145025	3,986
Computer Software	145030	1,927
Networking	145035	1,923
Network Operating Systems	145040	382
Network Management	145045	173
Network Security	145050	504
Routing and Switching	145055	326
Programming	145060	5,767
Object Oriented Programming	145065	531
Visual Programming	145070	495
Systems Analysis and Design	145075	105



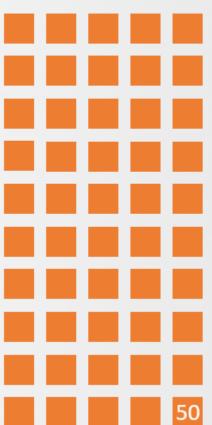


Table 29. Career Field 12: Information Technology Codes	Course	Enrollment
(14xxxx) CONT'D	code	SY 2020
Database Administration	145080	192
Game Design	145090	1,180
Design Techniques	145095	1,781
Creating and Editing Digital Graphics	145100	1,449
Video and Sound	145110	1,458
Animation	145115	970
3-D Techniques	145120	281
Interactive Application Development	145125	145
Cybersecurity	146005	299
Cybersecurity Defense and Reinforcement	146010	51
Cybersecurity Testing and Response	146015	61



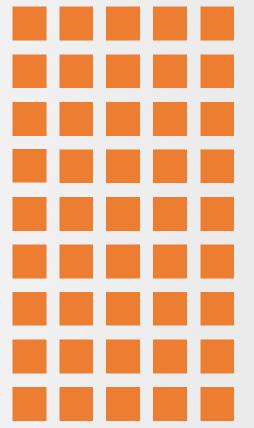


Table 24. Career Field 06: Engineering &	Course	Enrollment
Science Technologies Codes (17xxxx)	code	SY 2020
Robotics	175004	2,821

Table 37. International Baccalaureate Courses for Diploma Program (32xxxx)	Course code	Enrollment SY 2020
IB Information Technology in a		
Global Society (ITGS)	321150	
IB Computer Science	321600	59

Table 5. Business Education (Non-Career	Course	Enrollment
Technical) Codes (03xxxx)	code	SY 2020
Computer Programming and Software		
Development	31700	6,662



## What we heard the homework

High level – our shared understanding of next steps:

- Instead of adjusting the language in statute for Computer Science, the committee should agree on a common approach to operationalizing computer science when developing their concrete recommendations for the state.
- Computer Science is often confused with IT because there is overlap between the knowledge base required for both. The committee should extract the key IT concepts that are foundational to Computer Science.
- Computer science is broad and when the committee talks about challenges preventing school districts from offering computer science courses - there has to be clarity on which courses are reported as computer science to help inform recommendations more thoughtfully.

# Making recommendations....



## Operationalizing K-12 Computer Science Education

#### By legislation:

Within the plan, the committee shall include....(3) A requirement that the committee determine the best ways to compile data on computer science courses, teachers, and undergraduate students studying computer science in universities.

Our task: Determine the best ways for Ohio to compile data and report on computer science courses (k-12).



# Determine the best ways for Ohio to compile data and report on computer science courses (k-12).

## Workplan

- Individually | 5 min
  - Free write every idea that comes to mind on how you would solve this task
- Collaboratively (by lens) | 15 min
  - Share your ideas with the rest of the group. Work together in your group to create a better solution. Capture on your poster
- \*Jigsaw\* into new groups | 15 min
  - Explain solution. Work together in your group to create a better solution. Capture on your poster



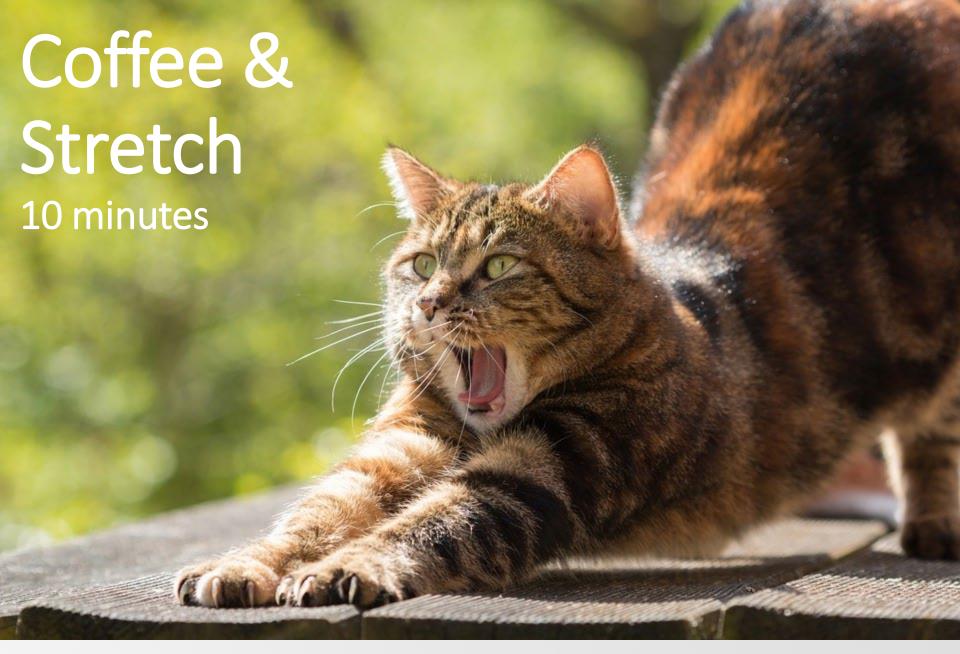
# Determine the best ways for Ohio to compile data and report on computer science courses (k-12)

- Gallery walk 6 minutes total (2 per poster)
  - Similarities/differences in approaches
  - What ideas do you like/dislike?
  - Clarifying questions you have?



### Reflection

- What are the similarities/differences in each recommendation?
- Are their parts you like/dislike about various solutions?
- Clarifying questions
- What do you think is the best recommendation to tackle this task?



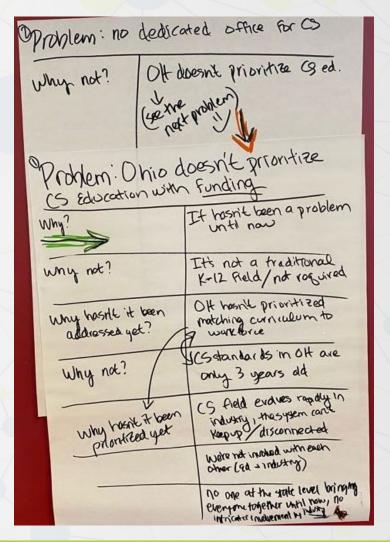


# Identified challenges





# Challenge:



The state has not prioritized
Computer Science
Education with resources.

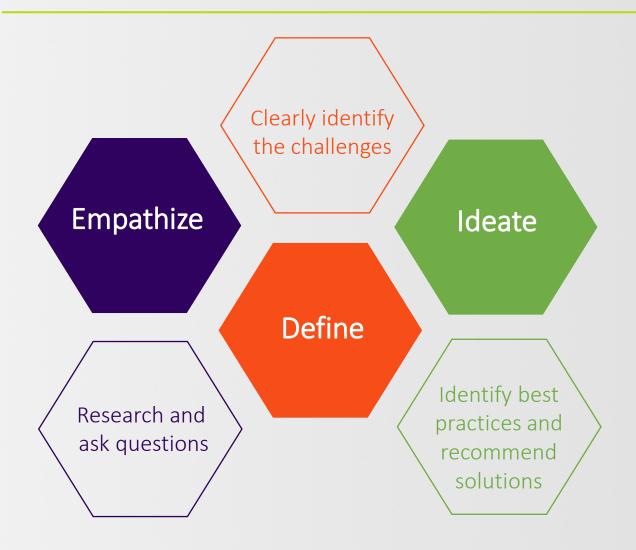


# The Five Why's

Define t	he	Problem		
<b>↓</b>				
Why?	$\rightarrow$	Answer	$\rightarrow$	Recommendation
	~			
Why?	<b>→</b>	Answer	$\rightarrow$	Recommendation
	~			
Why?	$\rightarrow$	Answer	$\rightarrow$	Recommendation
	~			
Why?	<b>→</b>	Answer	$\rightarrow$	Recommendation
	~			
Root Why?	<b>→</b>	Root Answer	$\rightarrow$	Recommendation



# Today focus on Empathize and Ideate





# Initial impression (individually)

#### Solution one

Creation of an
Office of
Computer Science
Education

#### Solution two

"One for CS"
State of Ohio
1% K-12 funding
investment in CS
education



# Challenge: The state has not prioritized Computer Science Education with resources.

Solution: Creation of an Office of Computer Science Education

Would this effectively solve this challenge?

2 No, it would No, it would Maybe Yes, it would Yes, it would keep Ohio move Ohio solve many create additional forward existing stagnant. barriers/ barriers/ without problems. creating new problems. barriers.



# Challenge: The state has not prioritized Computer Science Education with resources.

Solution: "One for CS" State of Ohio 1% K-12 funding investment in CS education.

## Would this effectively solve this challenge?

No, it would No, it would Maybe Yes, it would Yes, it would keep Ohio move Ohio solve many create additional forward existing stagnant. barriers/ barriers/ without problems. creating new problems. barriers.



Challenge:

They haven't had as instruction, don't know what it is, or have a perception it not interesting Perception the house they like behind
They didn't have it in K8
Of doesn't require it at the starte level 1 (or cross or great
It was hasn't be a problem

The state has not made Computer Science a requirement in K-12 education.



# Initial impression (individually)

#### Solution one

Creation of a
Student's Right
to Access CS

#### Solution two

Establishment
of CS as
Graduation
Requirement



# Challenge: The state has not made Computer Science a requirement in K-12 education.

## Solution: Creation of a Student's Right to Access CS

Would this effectively solve this challenge?

2 No, it would No, it would Maybe Yes, it would Yes, it would keep Ohio move Ohio solve many create additional forward existing stagnant. barriers/ barriers/ without problems. creating new problems. barriers.



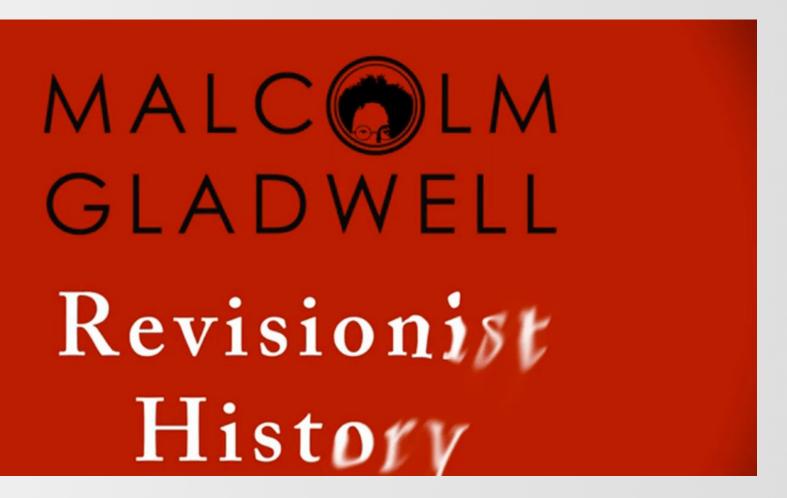
# Challenge: The state has not prioritized Computer Science Education with resources.

# Solution: Establishment of CS as Graduation Requirement

## Would this effectively solve this challenge?

No, it would No, it would Maybe Yes, it would Yes, it would keep Ohio move Ohio solve many create additional forward existing stagnant. barriers/ barriers/ without problems. creating new problems. barriers.





Episode: A Serious Game | August 19 2021



## Traffic jams had not occurred to him either.





## Game time

**Game goal:** Create the best-case scenario implementation of a given CS Solution.

Each committee member will get to review other scenarios for homework, and you'll get a chance to offer your thoughts and feedback.

We'll explain the instructions first, and then you'll get your random assignment.

### Rules

#### Part I: Empathize | 30 minutes total

- Pieces | Character card, player board, and CS Solved Note Catcher
- 10 min | Each team member should choose one character card. No repeats.

Read scenario. On your player board, empathize with your character and answer prompts about scenario.

- 10 min | Starting in card order, each character shares:
  - · one positive benefit for this stakeholder if this solution is realized
  - · players must silently listen taking notes on their note catcher unless it is there turn to share
  - once each player has shared a positive benefit, repeat but this time each player shares a negative impact or unintended consequence.
- 10 min | Full team conversation for prompt A

#### Part II: Ideate as a team | 30 minutes total

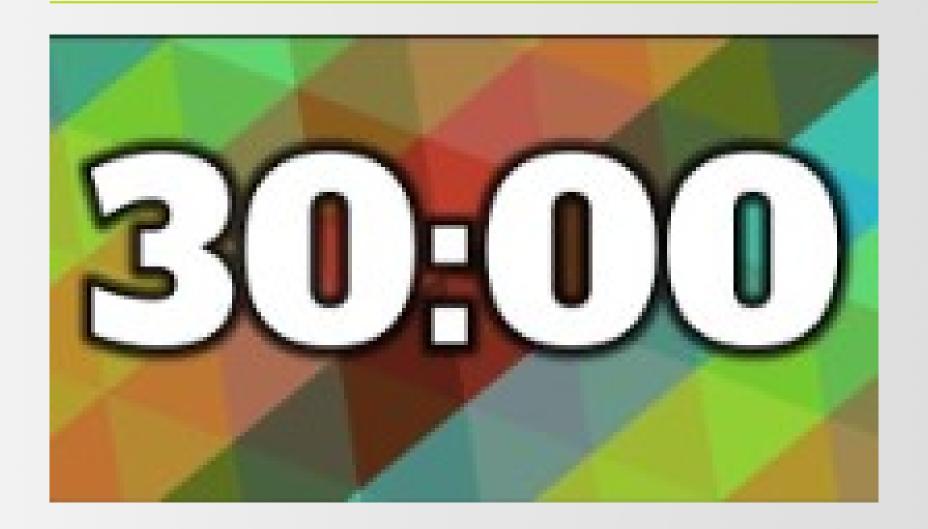
- Piece(s) | CS Solved Note Catchers II
- Full team conversation for prompt B, C, & D.
- Recorder will capture conversation. Part III provides a brief period of time to summarize your conversation in your <u>teams</u> own words for all other committee members to read.

### Part III: Capture Team Summary of Solution | 10 minutes

- Piece(s) | CS Solved Note Catchers I, II & III
- · Use the final 10 minutes to capture your summary using the third note catcher sheet.
- · As homework, each team's summary of the solution and implementation plan is sent out to the full committee.
  - Each committee member, re-assesses the ability of the solution to solve the challenge. Adds notes to improve upon each solution.

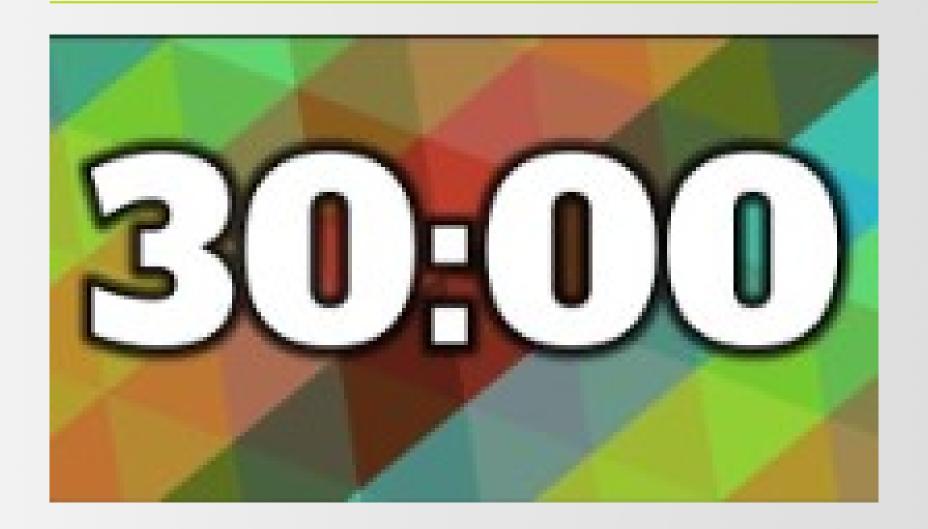


# Part I Timer | 30 minutes



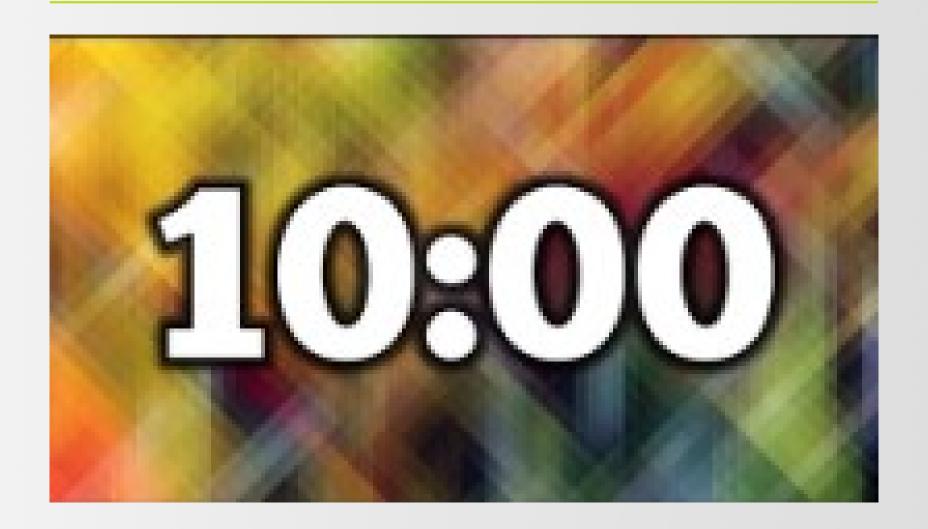


# Part II Timer | 30 minutes





# Part III Timer | 10 minutes





# In closing...



## What's next?

#### Today's Homework: Due March 1, 2022

Each committee member, read every team's capture document. Respond to each recommendation and implementation plan.

#### March 9, 2022

- Sub-team (same teams from today)
  - synthesizes the committee's individual feedback for the recommendation
  - Improve upon the recommendation
  - Report out on the recommendation
- Full committee
  - For each recommendation, discussion and sign off to: include, don't include, other action required

#### Pre-work for March 30, 2022

Pre -read on solutions to challenges preventing districts from offering computer science



# **Upcoming Meetings**

#### March 9 | At COSI

Note – did conversations today, spark any questions around the Ohio CS standards? Add questions to the parking lot and we will get an update to you from the CS standards committee in March.

March 30 April 20 May 11 June 1 & 2

\* Note: HB 110 gives us until October 2022, but plan to finish in spring.



# Closing



