

Microsoft
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TEALS

Volunteer & Teacher
Pocket Guide





Dear TEALS Volunteer and Teachers,

As we head into our 10th year, we created this guide to always be there in your pocket for a quick review, reminder, or inspiration when you are teaching or planning your next CS lesson. We hope it serves you well in your CS classroom journey. As always, thank you for your dedication and partnership helping high schools across North America build and grow their CS programs.

Kevin Wang
TEALS Founder && Ringleader



Pedagogical



Our Four Pillars for Teaching Computer Science



Notional Machine



Students need to build a mental model of how a computer works



Problem Solving



Using strategies to help solve CS problems and bugs is an integral part of what students need to learn and do

Content Knowledge



Look for the symbols that correspond to each Pillar throughout the Guide!



Hierarchy of Skills



Teachers should be mindful about the varying complexity of CS concepts and the assessments we create, as learning to write programs is a many-layered skill



Cultural Responsiveness



Teachers should help build all students' identities as computer scientists by being mindful of their cultural backgrounds

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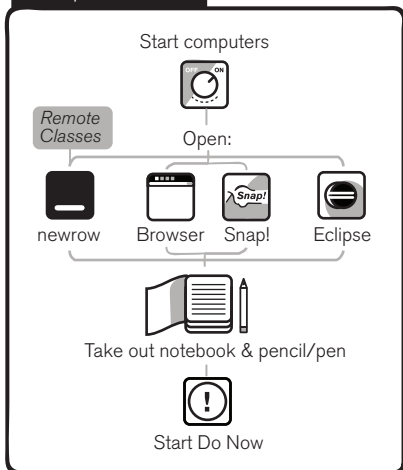
Classroom Procedures

Classroom procedures help your class run smoother with little waste of time.

- Create new ones opportunistically
- Optimize for efficiency
- Plan to teach and rehearse them

Example Procedure

Start of Class



Encouraging Productive Discussions



Take turns
being the first one to talk



Take turns
presenting ideas

Do not dominate
the conversation



Think about alternative
ways to solve the problem



Ask for clarification

Even if your group-mate has said something very clearly and correctly, it's a good idea to repeat it yourself



Repeat other student's
questions and answer





Differentiated Instruction

Help *all students* grow and learn in your classroom

Consider different groups of students during planning

Add scaffolding to move up or down **Bloom's Taxonomy**

Tailor to students' strengths, interests, background, home life, and lived experiences

Allow for student choice:

How do they demonstrate mastery of new content

Select some, not all, of quiz questions

Project alternatives

2

3

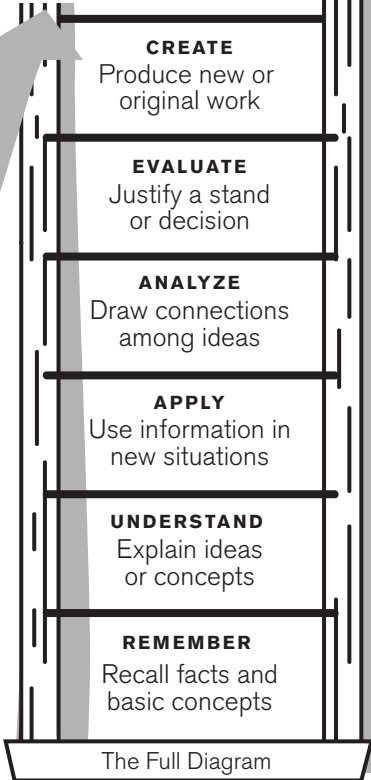
4

5





Bloom's Taxonomy





Culturally Responsive Teaching

A way of teaching that includes students' cultural references in all aspects of learning to increase the participation and achievement of students from underrepresented groups

WHO I AM

Ethnicity

INTERNAL

Gender

Ability

Age

Religion

Sexual
Orientation

Race

Socioeconomic
Status

EXTERNAL

Language

Appearance

Geographic Location

Educational Attainment

INSTITUTIONAL

Status

Seniority

Teams, Clubs,
Affiliations

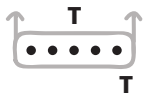
School
Location

Division, Staff,
Department



Co-Teaching Configurations

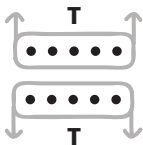
Which format is most useful for today's lesson?



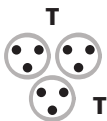
One Teach,
One Support



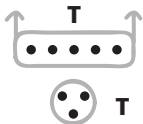
Team Teaching



Parallel Teaching



Station Teaching



Alternative Teaching



The Habits of Highly-Effective TAs

During Instruction

- Determine which students will need the most help
- Check who turned in assignments
- Work with previously-absent students
- Interject with alternative explanations or personal anecdotes
- Hand out raffle tickets

During Lab

- Provide differentiated instruction to students who need individual attention
- Lead a review session on a tricky topic

Outside Class

(PG 21)

- Create additional *formative assessments*
- Help with grading
- Help classroom teacher learn material

Raffle Tickets



Give them out for:

Participation

Helping other students

Notebooks

Extra credit

Then do:

Weekly and/or monthly drawings

*Raffle items not provided by TEALS
for classroom enrichment classes.*





Getting to Know the Students



Learn and use student names



Name placards
Seating charts
Mnemonics

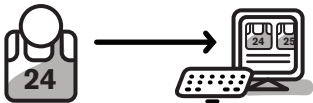


Insist students use your name

Learn about students' interests

Student experiences survey
Chat before or after class
Attend school and community events

Incorporate student interests into examples and assignments



<https://aka.ms/tealsknowstudents>






Giving Encouragement

Set high expectations

Give personal assurance

Provide an *actionable next step*
(see pg 29)

A cartoon illustration of an owl wearing glasses and a suit, looking upwards with a supportive expression. A large speech bubble originates from the owl, containing the text.

You're struggling because this is a hard problem. I know you have the tools you need to be able to work this out!





Re-engaging with Distracted Students



Avoid escalation. When in doubt, get help from the classroom teacher.

Walk closer to student

Remote Option -
Join a Breakout Room



Consider a seating chart to break up disruptive pairs



Break up activities into chunks



Incentivize with raffle tickets



Re-evaluate pacing of the lesson or lab



Dealing with Failure/ Growth Mindset



Growth Mindset

Abilities can be acquired through study and effort.



Explain the growth mindset to the class and reference it often

Share your experiences with *failure*.



<https://aka.ms/tealsgrowth>





Amygdala Hijack

Prevent an amygdala hijack by watching out for potential threats to one's:



CONTROL



CONNECTIONS



STANDING



CERTAINTY



EQUITY

What to do when you or a student feels vulnerable:



Stop



Observe
10s pause
to breathe
and think



Detach
yourself
from the
need to
be right



Awaken
empathy
and think
from their
perspective





Enrolling Diverse Students

Cast a broad net to appeal to all students.



Aim for your CS roster to match the demographic makeup of the student body.



Advocate with guidance counselors and administrators for building an inclusive CS class - the guide to enrolling diverse students can help!

Click or visit this address for our extensive *Guide To Enrolling Diverse Students*

<https://aka.ms/tealsdiversestudents>





Learning Objectives

Write objectives on the board!



SWBAT: explain what a SWBAT is and why it's important to learning

SAVE

?

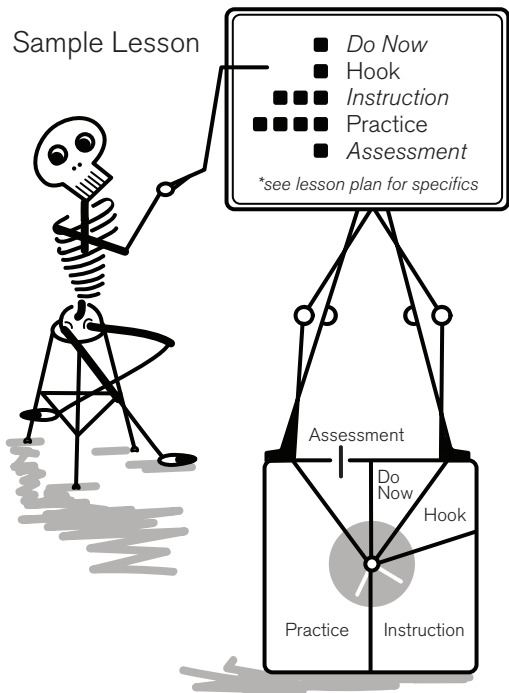
What is SWBAT?

SWBAT stands for "Students will be able to." It's a short student-centered learning objective that implies a method of assessment.



Anatomy of a Lesson

Sample Lesson



Do Now / Warm Up

A quick start-of-class focusing activity that may assess student progress, review recent content, or foreshadow the day's lesson

- ☐ A problem related to previous lesson
- ☐ Review HW with a peer
- ☐ A challenge that will be explained by today's lesson



5 Minutes of every class period!





Hook

A lead-in to the day's lesson designed to pique students' interest and curiosity



Questions



Puzzles



Video



Demo



Photos



Current Event

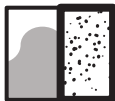
```
1  if (x = 12)
```



Challenge w/
sample code:
what's wrong?



Relate to students' interests
or they'll never hear you.



5 Minutes of every class period!



Instruction (25%)

Explanations

Definitions

Walkthrough

Research

Worked Example

Demonstration

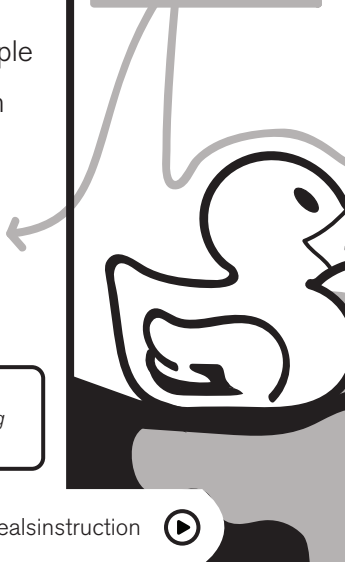
Role playing

CS Unplugged
Activity

Discussions



Go beyond lecture
with *active learning*
techniques (p. 22)



Practice (75%)

[individual, pair, or group work]

Labs

Projects

Worksheets

Textbook problems

Creating presentations

Try to keep Practice at
75% of your class period,
and Instruction at 25%.





Assessments

Formative Assessments

A quiz provides a chance for students to demonstrate their knowledge, while a project checkpoint leaves room for feedback and redirection.

A lab is a great in-class option for participation and group-learning.

A worksheet is similar to a quiz and individual or group questioning is the quickest way to dialogue with students.

Summative Assessments

A project or test allows students to demonstrate what they learned at the end of a unit



Active Learning Strategies

"What matters is not what the teacher teaches but what the student learns."

Try the formats below to keep students engaged in the learning process.



Discussion



Tutorial



Debate



Role Play



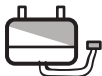
Worked example



Student presentations



Game



Unplugged activity



Before Class Checklist

☐ Arrive early



☐ PG 15 Ensure that Learning Objectives are visible to students in classroom.



☐ PG 17 Share the Do Now.

☐ Re-read the lesson plan



☐ Power up all machines



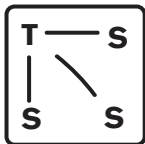
☐ PG 18 Have a Hook



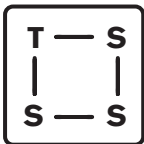
Questioning Techniques

Look- a silent room is no fun, but kids don't always want to be called on. Create an interactive classroom where everyone participates.

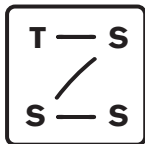
A Playbook to Keep it Moving



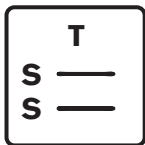
Cold calling
(with warning)



Around
the World



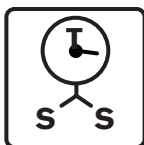
Popcorn



Everyone
Writes



Think Pair
Share



Wait Time

T You **S** Student — The Question





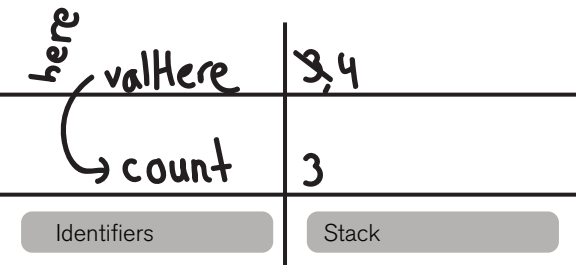
Worked Examples

Methods/Functions

```

1 >      def here(valHere)
2 >          valHere = valHere + 1
→ 3 >      return valHere

4 >      count = 3
→ 5 >      count = here(count)
  
```



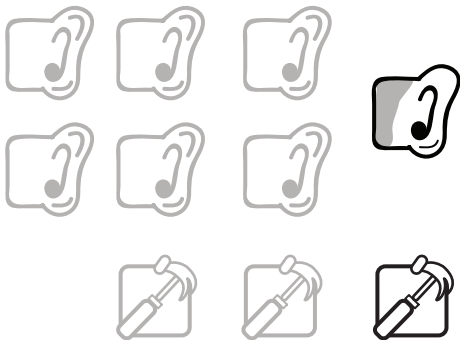
Lthaca-Style Memory Diagrams
are useful for visualizing the internal state
of computer while tracing

Great for worked examples in class!



Repetition

Students need to hear things 7 times or do them 3 times



before they are added to long-term memory!

Notebooks

Studies show hand-written notes are an important part of active learning

Part of classroom procedures to take out notebook

Tell students to write important concepts in notebook

Ask students to look up answer in notebooks

Notebook checks once a week

Hand out notebook stickers for job well done

Allow written cheat sheet on tests



Meerkat

To ensure all students receive support

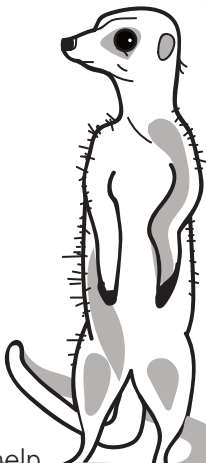
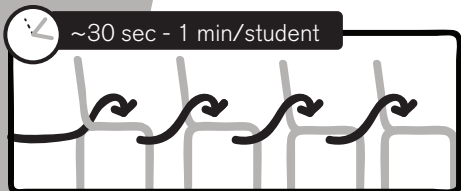
Quick interactions,
30-60 seconds

Triage through
Socratic Questioning

See each student
and check in even if
they did not ask for help.

Ask open ended questions, not Y/N
questions:

“What are you working on?”





Socratic Questioning

Diagnose

"How are you doing?"

"What is this supposed to do?"

"How does it work?"

Ask Leading Questions

"Where would be a good place to put a print statement?"

"What can you do to isolate the problem?"

Give an Actionable Next Step

"Think back to lab 3.2 and see if that helps."

"Trace through this loop to see if you can find a bug."

"Look at your notebook to see if you can find something similar that will help you."





Students Seeking Help



Look up in notebook.

Look at previous code

```
1 for (int i = 0; i < 10; i++)
```



Remote Classes:

Call instructor on newrow



Ask another student for help



=



Cup right-side-up for help



Make a queue of student names

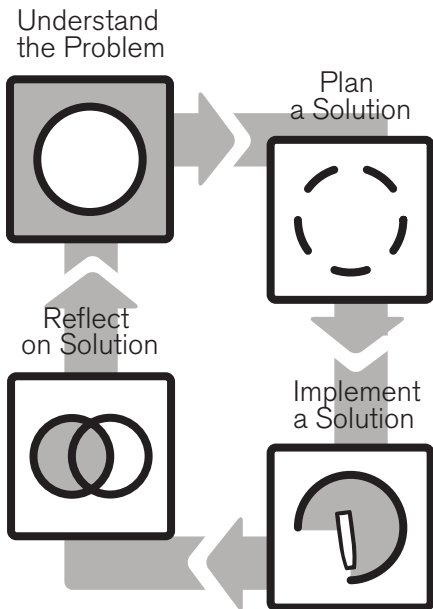
If fielding the same questions:

- Reteach entire class or
- Create a breakout group to reteach





Four Steps to Solving any Problem





Building Problem Solving Skills



Subgoal Labeling:

When you give a *short, clear label* to each part of your program to illustrate what it does. You can incorporate this into labs, starter code, and sample solutions.

Debugging strategies to teach students:



Rubber Duck



Print statements



Isolating the bug and/or simplifying code



Academic Honesty

Set clear expectations on a per-assignment basis: in groups, in pairs, with a buddy, solo.

Example:

During lab, students are not allowed to touch another student's keyboard or mouse



Explicitly state the allowed resources: internet, textbook, notes; no external resources.

Use face-to-face grading of student project.

Require students to cite resources used when working with peers, site collaborators

Refer to classroom teacher



Grading Strategies

Type of Grading	Best for
Peer Grading	Homework, small assignments
Check / No check	Homework, labs
Self Grading	Homework, small assignments
Correctness	Test Quizzes
Rubrics	Projects
Comments	Any time
Written Feedback	Major Projects
Face to Face	Major Projects





Formative Assessments - Quick

Data collected about what students are learning while they are still engaged in the learning process.

Quick Assessments

Choose an assessment based on the amount of time you have and how thorough you would like to be. Fewer options lead to faster but less thorough assessments.

Fists/palms or Red Cup / Green Cup



Stoplight Cards



1 to 5 fingers

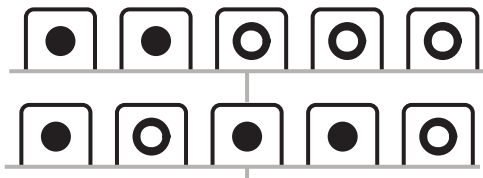


Or, Everyone Writes





Formative Assessments - Online Tools



Some online tools to help with quick formative assessments and surveys

Kahoot.it

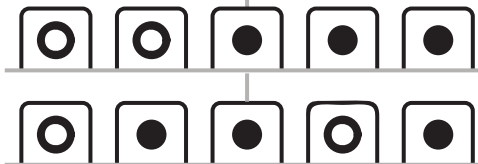
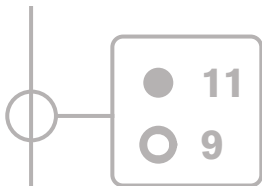
Socrative.com

Plickers.com

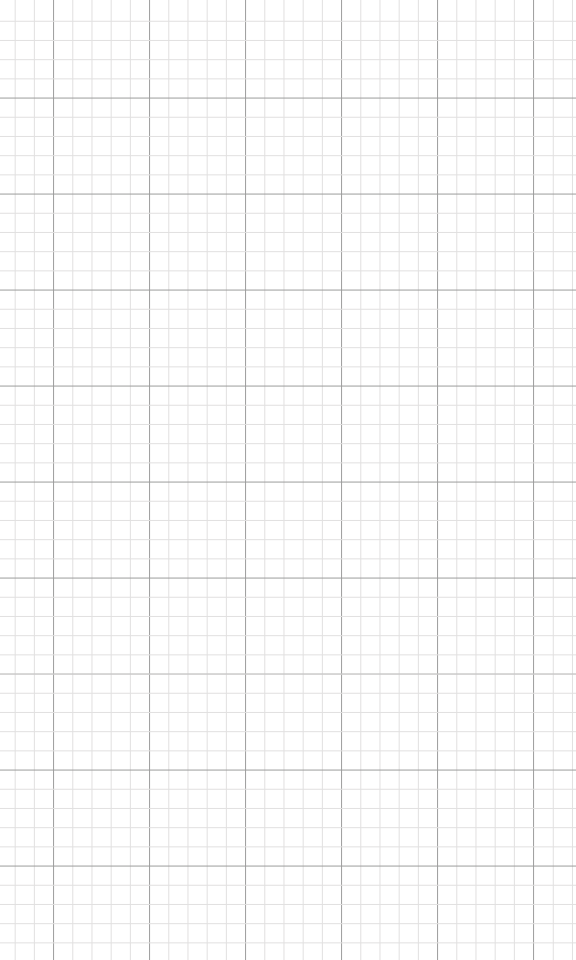
Nearpod.com

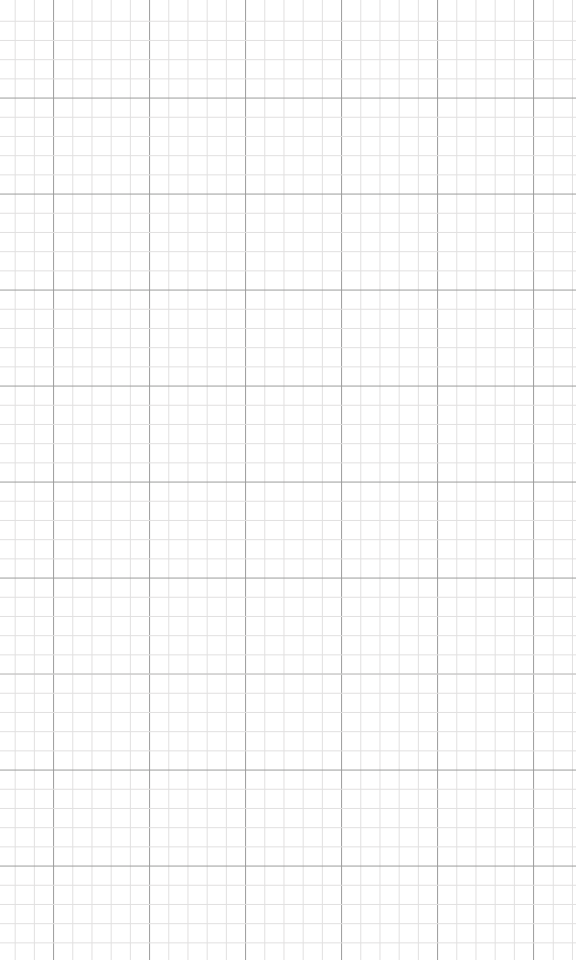
newrow quiz

(remote only)









Resources

TEALS Regional Manager

Contact:

TEALS Dashboard

Sign In:

<https://www.tealsk12.org/dashboard/>

Forums

<https://forums.tealsk12.org/>

A helpful reminder of all the things
you learned that will make your
life easier.

In specific circumstances anyway.

Microsoft
Philanthropies

TEALS



<https://www.tealsk12.org/>