ORACLE

Java in Education

Oracle Java Developer Relations

October 2024 JCP EC Meeting
Seattle, WA

We are Moved By Java and Want New Learners to Feel the Same

Inspired

Java is the language of the Art of the Possible

It encourages creative solutions, is relevant to the problems of the future, and creates opportunity

Unstoppable

Java is the language of the Art of the Probable

It makes simple things simple, makes difficult things possible, and can be used to create anything

Connected

Java is the language of a Vibrant Community

It is a diverse, inclusive, energetic tribe of developers who feel respected, heard, and supported

Sampling of Learnings from Education Sector

Developer Experience	• Activation Energy required is too high. Getting started with “hello world” isn’t simple. • Knowing what to install isn’t trivial and many students work on chromebooks so cannot install anything. • Teachers are on IT managed machines which often dictates use of Java 8 and only the core JDK. • Negative feedback about public static void main(String[] args) and esoteric error messages. • The ecosystem of libraries, frameworks and tools is complex to navigate for new developers but necessary to relevant creation.
Learning Experience	• Advanced Java concepts, like OOP, are hard to grasp for young people with no coding experience and not the best place to begin. • Young people expect immediate, tangible results that are more complex than they are ready for, with a physical or visual component. • Examples of creative, relevant, fun, modern Java projects are not easily discovered. • It is hard for teachers to keep up with the pace of technology. • Primary and secondary teachers face a whole host of secondary issues such as lack of training and funding. • University professors can be resistant to change. • Industry demand for grads with modern Java knowledge must be loud and clear. • Broader Education industry is also in flux and necessitates change, such as alternatives to 4 years colleges.
Community	• The Python community is perceived as open, vibrant, and diverse by young people. Java is seen as the opposite. • Java doesn’t have a strong presence within the education ecosystem, at associated conferences, or where young people engage.
Perception	• Most of the Education System is on Java 8 feeding the perception that Java is too hard, irrelevant, and dying. • Python syntax is perceived as simple to get started, and it is seen as the language of modern problem solving with data. • Java is perceived as the language of legacy middleware, not of newer technology trends (AI/ML). • Kids, especially those from diverse backgrounds, cannot envision themselves as future Java developers. • When corporations sponsor education conferences for Java promotion, the booths and offerings have a staid, outdated feel.

Growing New Java Developers is Critical to Java's Future

The Good News: Java is still entrenched.

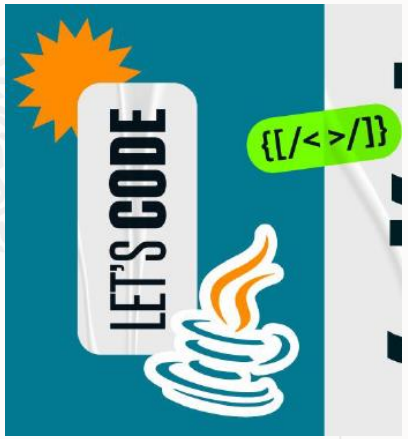
The problem: The next generation perceives Java as not modern, too complex, not fun, not inclusive, not listening.

The impact: Slow death of Java, inevitable decline in business, loss of credibility/influence with developers.

Moving the needle requires:

1. Changing the **perception** by modernizing Java in the education sector
2. Simplifying the **developer experience** by making it easy to get started
3. Creating a delightful **learning experience** to enable teachers and the provider ecosystem to succeed
4. Building and fostering a **community** for students that is diverse, inclusive, supportive, and that "looks like them"

Learning: Java Must Inspire the Next Generation



More specifically, what are some things that will motivate students?

- Inspiring content
  - Build compelling, modern examples and solutions to interesting problems
  - Document and promote human and technical stories from real professionals
  - Amplify job potential

- Time-to-wow must be fast and examples readily available
  - Continue investing in language improvements for first experience (Amber, Paving the Onramp)
  - Create content and scaffold solutions to enable students, teachers, and education providers
  - Reduce time to first line of code (local and online environments, dependency management)

- Build connections to community
  - Engage at key education conferences and with education providers (SIGCSE, CSTA, Code.org)
  - Motivate Professionals to host JUG meetings and/or give talks on college campuses or classes
  - Motivate Professionals to volunteer in local schools or CS competitions like First Robotics

Investments in Amber/Onramp, VS Code, and Playground Well Received

Highlighted comment

@iheanyichukwuaguwa6231 1 day ago

Thanks guys! This is super awesome. We, the educators, asked and you listened. With the new modifications to the implicitly declared classes and the automatic imports of java.util, java.math and most importantly of the extremely handy static methods in the new IO class, it's time to revert to teaching introductory programming courses with our beloved Java.

Reply

J

javalover8000 ★★★★★

Tuesday

THE BESTT!!!! PROGRAMMING LANGUAGE@!!!!! EVER!!!!!!!!!! I LOVE JAVA!!!!!!!!!! JAVA #1 !!!!!!!! BETTER THAN PYTHON C C++ AND ASSEMBLY CODE COMBINED!!!!

Akhilesh Singh ★★★★★

5/20/2024

Great coding experience. Very efficient and well thought out in all areas. Impressive utilisation & documentation of latest Java features.

Java

Oracle Corporation oracle.com | 1,029,348 installs | ★★★★★ (16) | Free

Java Platform Extension for Visual Studio Code

Install Trouble Installing?

Steven Daniel

@csharptitan

The Java Playground is an awesome feature and shouldn't been overlooked. Its great for testing out code/snippets as well as it being a great starting point for students new to Java.

- https://openjdk.org/projects/amber/design-notes/on-ramp
- https://openjdk.org/jeps/477
- https://marketplace.visualstudio.com/items?itemName=Oracle.oracle-java
- https://dev.java/playground/

Grades 9-12

College Board: Updating AP CSA

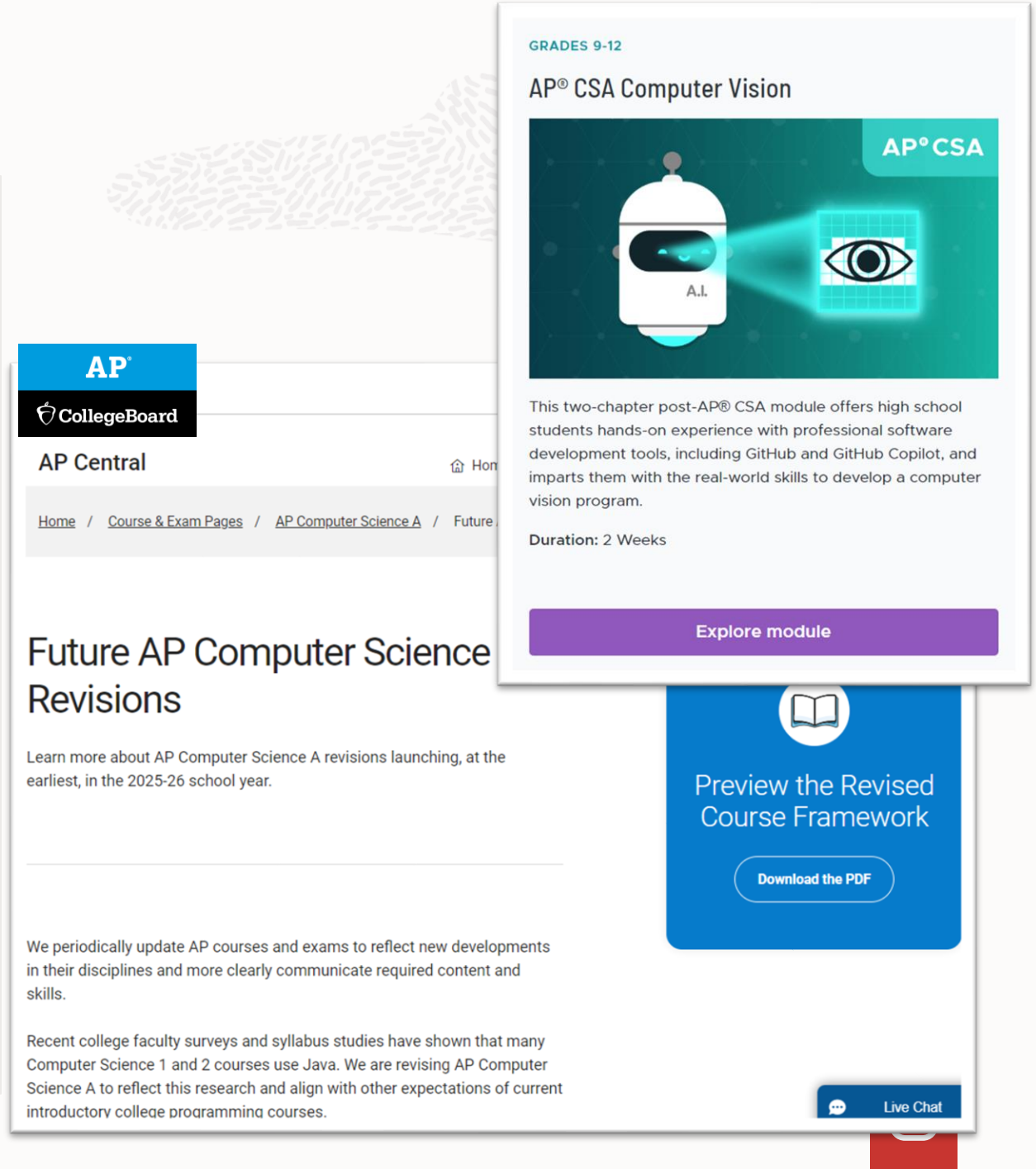
- "Recent college faculty surveys and syllabus survey have shown that many Computer Science 1 and 2 courses use Java."
- Target for Update: 2025-26 school year
- Requires latest LTS or later
- Supporting teacher training

Code.org: Computer vision + modern tooling unit

- Piloted in 2023-24 school year with high demand
- Uses Oracle VS Code extension
- Co-talk at SIGCSE that was well received by higher educators
- So popular that they are expanding unit to Python for CSP

Case Studies with high school CS teachers

- Rewards app unit
- Incorporates modern Java and JavaFX
- Uses IntelliJ + Scene Builder



Recent University Engagement Example

SIGCSE 2024 Workshop “Exploring Java Programming After Java 8”

What did we cover?

- State of Java and how we develop Java
- Hands-on work plus discussion for classroom use
- VS Code extension
- Java Playground
- Implicitly Declared Classes & Instance Main Methods
- String Templates
- Records
- Pattern Matching
- Switch Statements
- Sealed Classes and Interfaces
- Computer Vision and Modern Tooling w/Code.org

What did they value?

- Writing Java code
- Hands-on w/newer features and capabilities
- Attention to Modern Trends (AI)
- Access to experts for discussion
- Knowledge of what is coming
- Excellent presentation

What was frustrating?

- Setup and Configuration
- Prefer IDE agnostic

What would they like to see in the future?

- More info about planned changes
- Better snacks ☺

Learning: Higher Education is Complex

Things we've learned about the landscape

- Teaching Professors, 2-year schools, trade schools are most open to change
  - Success judged by producing successful graduates with skills to get jobs
  - Any money is a win – they are typically budget starved
  - There is a student trend away from larger, more expensive universities based on ROI
- Tenured Professors are typically change averse
  - Don't want to take time to revamp courses and are often in charge of curriculum decisions
  - Success judged by research $ and publications
  - Java's strength is in CS2 in nearly all universities and is still entrenched in the majority of CS1 in others
- Deans and Department Heads have broader view of success, care about ROI, and have power to enact change
  - Changing programs is costly so where Java is entrenched, they would prefer not to have to change
  - In smaller universities, professors with Java experience are retiring - no Java "bench" creating a dilemma
  - New CS-related degree programs are typically stood up with Python first

Learning: Higher Education is More Complex and Relationships Matter

Comprehensive Partnership Models Perceived as Successful

Build trusted relationships with education communities

- Direct engagement with each institution
- Participation in the community

Research Collaboration

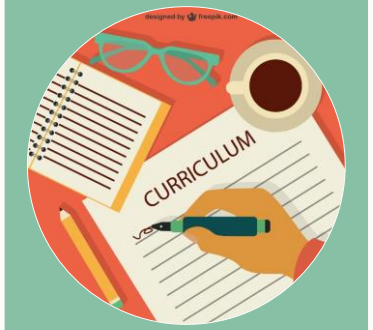
- Research Fellows
- Research Grants

People Exchange

- Faculty in Residence
- Googler in Residence

Influence Teaching and Learning

- CS Ed Research
- Conferences
- Tech Exchange
- Education Toolkits and Environments



Contribute to Curriculum

- Brand New Courses
- Brand New Degree Programs

Professional Development Opportunities

- Industry Sponsored Workshops
- Internships

Partnerships perceived as effective when a company invests in all of these with a university

Underlying expectation: Industry and Universities must together influence state and government policy for best results

Thoughts or questions?

Appendix

Paving the On Ramp

Before

```
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello, World!");
    }
}
```

- Classes for modeling and organization
- Static vs instance behavior
- Command line interaction, arrays
- Magic method name
- Access control
- Static fields

After

```
void main() {
    println(“Hello!”);
}
```


Java Playground at Dev.java