This Does Compute!
Developing and Implementing a 3–12 Computer Science Curriculum for Girls

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Marymount School of New York
How Girls Learn

• Carol Gilligan, 1982
• The way girls think, interact, display leadership and make decisions is psychologically and developmentally different
• Girls need their own learning model
Girls and STEM

- UCLA Study, 2009
- Girls' schools graduates have more confidence in mathematics and computer abilities
- More likely to pursue careers in engineering
Girls and STEM

- AAUW Report, 2010
- Increase in the number of women in STEM careers
- Girls and boys take science and math courses in equal numbers
- Girls leave high school prepared to study STEM
- Fewer women than men pursue STEM careers
Girls and STEM

- Girls thrive in an environment of interconnectedness
- Connectedness is important in relationship with technology
- Need to connect to others, through technology and through interdisciplinary learning
- Wide range of instructional strategies and techniques
- Traditional pedagogy tends to be objective and content laden
Key Consideration

- Effective teaching is effective teaching.
How do we promote active engagement in computer science for girls?
The Marymount Model

• Move “content-based technology” – Word, Excel, iMovie, Podcasting, etc. – into the classroom
• Empower teachers as technologists
• Redesign 1–12 technology curriculum to focus on computer programming
• Start robotics in Class I
• Integrate Arduino technology, physical computing and Fab Lab into curriculum
Our Curriculum

Programming Curriculum @ Marymount

- Class III: Mindstorms NXT Robotics
- Class IV: Microworlds
- Class V: Scratch Intro.
- Class VI: Animations using Photoshop
- Class VII: Advanced Scratch & Pico Boards
- Class VIII: Gamestar Mechanic
- Class IX: Programming cont.
Connecting Students to Careers

- Guest Speaker Series
- Google Engineer for a Day
- Google Programmer
- Light Up Your Mind Day
- Developer and designer from design firm
- National Lab Day
- Connecting by Skype
To succeed in today’s Creative Society, students must learn to think creatively, plan systematically, analyze critically, work collaboratively, communicate clearly, design interactively, and learn continuously. – Mitchel Resnick, MIT Media Lab

"cool nerds" (Lohr, 2009)
Middle School Programming

MicroWorlds EX

- Focus on basic geometry vocabulary: line, line segment, rays, points, etc.
- Procedures such as: short cuts, repeat function, programming buttons
1) Label and draw each of the shapes figured. Make a procedure for each of them in the procedures window. Remember to use to and end when writing procedures.

2) Extra Credit:
Middle School Programming

- Class VII Scratch Programming
- Revolutionary War Games
- End of Year Collaborative Games
- Social Justice
Scratch Programming

![Scratch Programming](image)

**SHEEP RUN!**

PRESS SPACE
By Olivia, Victoria, and Isabelle!
Upper School Programming

Class VIII Gamestar Mechanic

Concepts covered: scaffolding, rotation, debugging, feedback rules

Focus on collaboration
Gamestar Mechanic

AMD Awareness Challenge winner

Social Justice

Designed by EHEALY

Rating: 💫💫💫💫💫

Difficulty: 💫💫💫💫💫

Review Notes:
What did you like about the game?
What should the designer fix?
Class IX Computer Science

• Programming not programs
• First year
  ✓ Challenges of abstract thinking
  ✓ Algorithms and sorting, oh my!
  ✓ Gentler learning curve
• Second year
  ✓ Concrete beginnings – HTTP, HTML & CSS
  ✓ Build towards programming – Javascript
  ✓ Next year: faster at the start
"Take nothing but pictures. Leave nothing but footprints. Kill nothing but time." ~ Motto of the Baltimore Grotto, a caving society

In our modern day society, we pay little attention to the *water* we waste, the trash we throw out instead of *recycling* it, and the air that we *pollute*. It is our job as humans to take care of our *beautiful* planet!

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body {
  color: #005500;
  background: #aaffcc;
  font-family: 'helvetica neue', arial, sans-serif;
  font-size: 100%;
  margin: 0 auto 0px;
  width: 800px;
  border-top: 2px solid green;
  border-bottom: 2px solid green;
  padding-left: 10px;
  padding-right: 10px;
  border-left: 2px solid green;
  border-right: 2px solid green;
}

h1 {
  color: white;
  background: green;
  font-family: 'century gothic', arial, Geneva, sans-serif;
  font-weight: normal;
  text-align: center;
  -moz-border-radius: 10px;
  -webkit-border-radius: 10px;
  border-radius: 10px;
}

h2 {
  font-size: 75%;
}

p {
  font-family: 'helvetica neue', arial, sans-serif;
}

dl {
  padding-left: 10px;
}

d a:link {
  color: #696969;
}
Class XII Programming

- First year
  - Ruby, take one
  - Git, team projects, games
- Second year
  - Ruby & Rails
  - Git, team projects, webapps
Class XII Programming

Required flags:
- `-n, --name NAME` Set player's name

Optional flags:
- `-1, --letter LETTER` Choose X or O (Omit & default is X.)
- `-f, --first` Go first? (Omit & you go first by default.)

Generic options:
- `-v, --version` Display version
- `-h, --help` Show this message

Hello, Peter, and welcome. Here's the board you'll be playing on. Remember the numbers since you will use them to pick your moves.

1 2 3
4 5 6
7 8 9

What's your move?
Class XII Programming

MMTweets

What's up?

Submit

Peter Aronoff Wow, this place has grown.
Lots of new faces!
Posted 7 days ago.

Sophie Just watched Real Housewives of NY.
My IQ level just dropped by 100. It's ok, it'll even out because I'm about to resume my book.
Posted 10 days ago.

Yuka Doyama ahhh prom is so close -
Posted 10 days ago.

Peter Aronoff Oops, no text, not allowed. #fail
Posted 19 days ago.
STEM Research/Internship Program

- Classes VIII – XI
- Summer Internship Experience – 30 hours
- Summer Research Program
- Class XII Internship Program