STEM and Special Needs

A Revolution in Special Education

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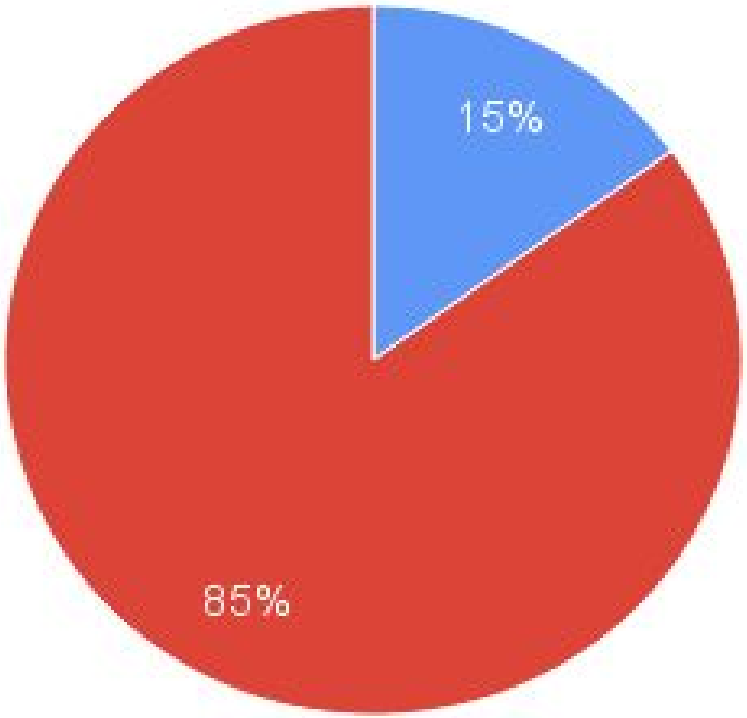
STEM Education for The Help Group

Between 80% and 90% of individuals with special needs are unemployed or underemployed

The cost of raising a child with autism over her lifetime is $2.3 million dollars (Autism Speaks—reported on Money online 2014), much of it borne by the family, the state or federal government.


15%
85%
Employed
Unemployed or underemployed

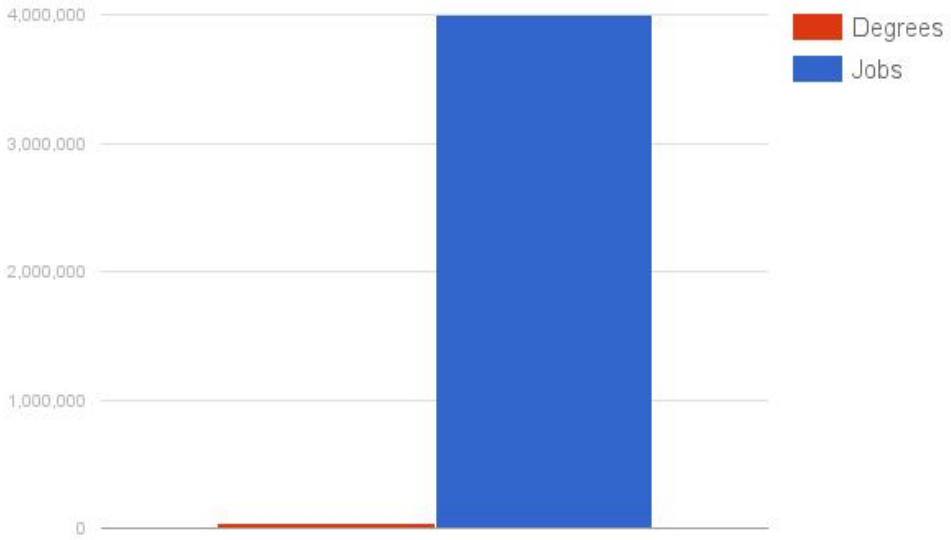
Every once in a while opportunities come along that change everything

Opportunity in the Marketplace

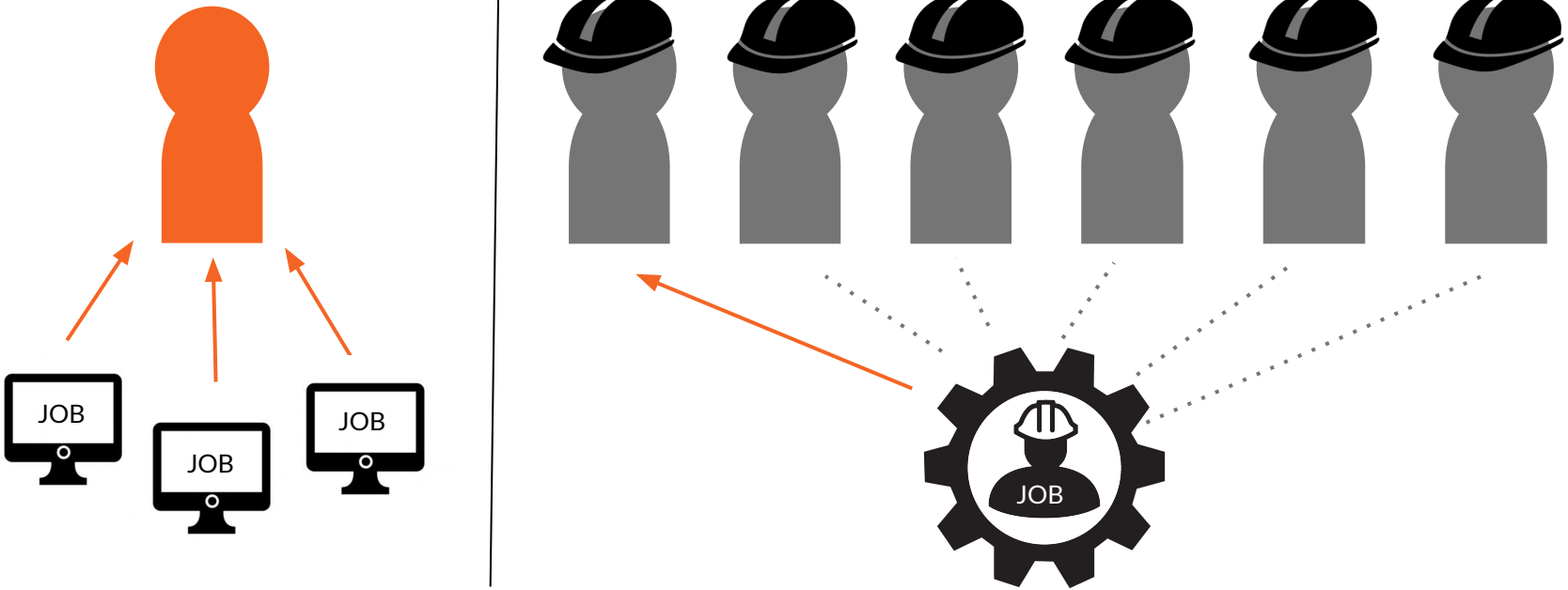
- Much has been done to isolate the physical, biological, and psychological underpinnings of autism and those with special needs

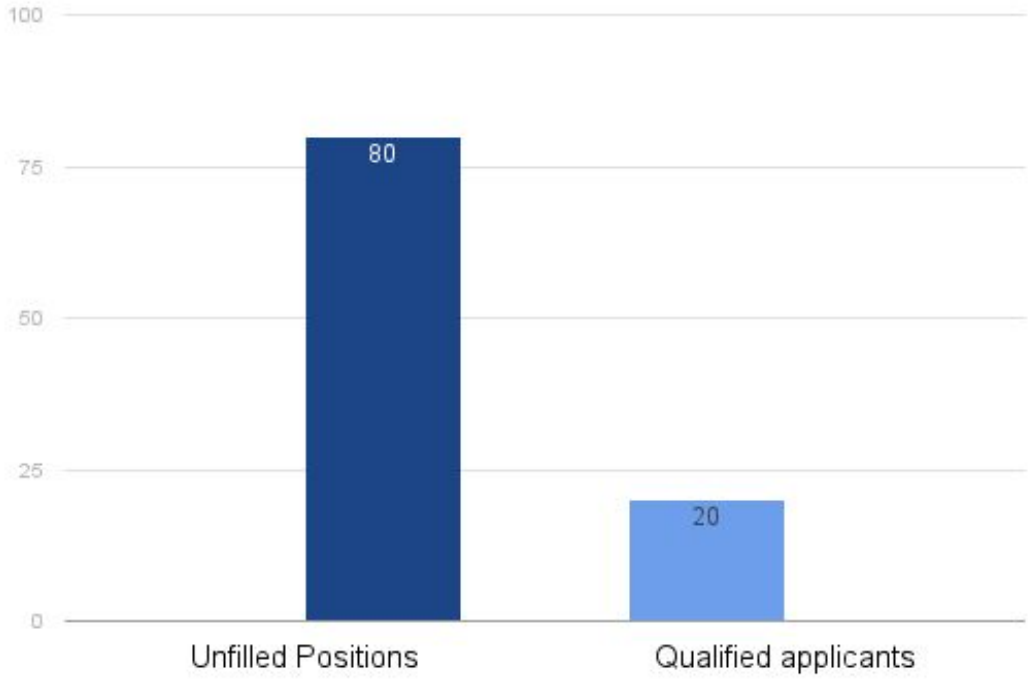
- Little has been done to explore the opportunities our students might have based on their strengths and interests

Huge demand for technically trained workers in all fields—Burning Glass (labor market analytics) there are 40,000 computer science bachelor's degrees awarded each year, but 4 million job vacancies



Conference Board—for every 1 computer worker, there are 3 available jobs; for every 6 construction workers, there is only 1 available job





According to a 2015 BLS report, data scientists are in huge demand—some estimates are that perhaps 20% of industry needs can be met by qualified applicants

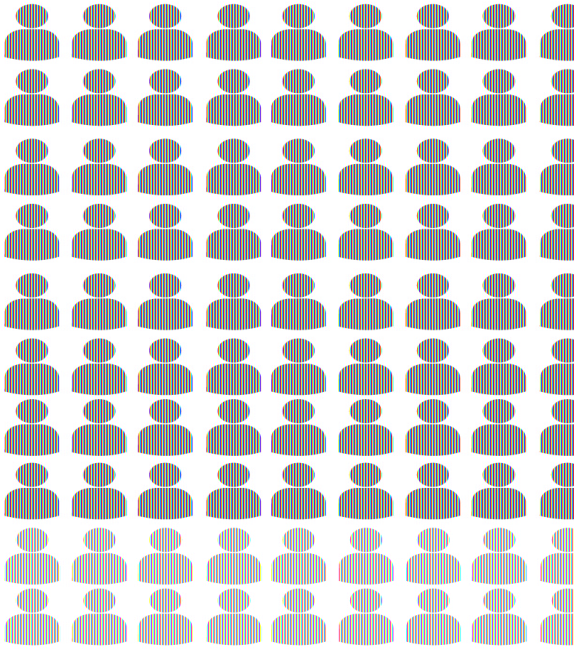
Our population has a natural affinity for STEM pursuits

- They can persevere at a problem, topic long after others would have given up
- They can narrow their focus, honing in on the particular problem to the exclusion of all else
- They often have a strong visual memory and recall, helpful in bringing knowledge to apply in areas previously unrelated
- They can be precocious in math or languages

Commerce and industry are specifically interested in hiring and training those with special needs who have the aptitude and the motivation

Although those on the spectrum enroll in college to a far lesser degree than their peers, they register **for STEM classes to a much higher degree (34% vs. 22%)**

5.7 million job openings in STEM fields
for BA and entry level with
less than 2 years experience

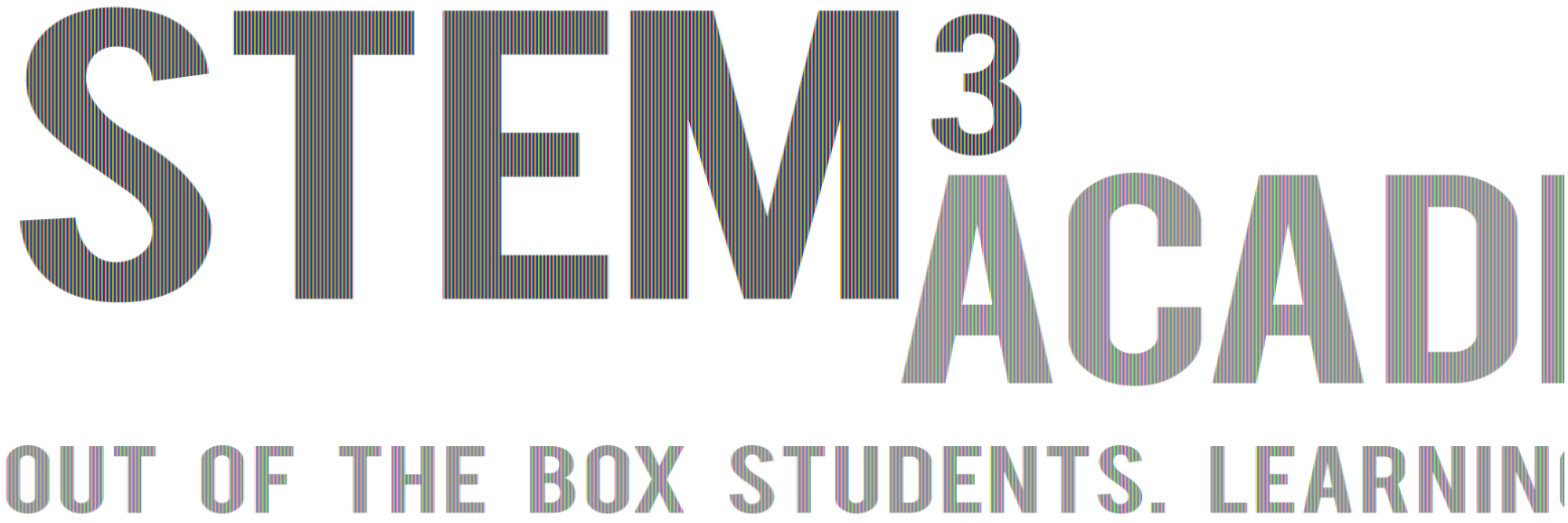


80-90% unemployed

Opportunity in Education

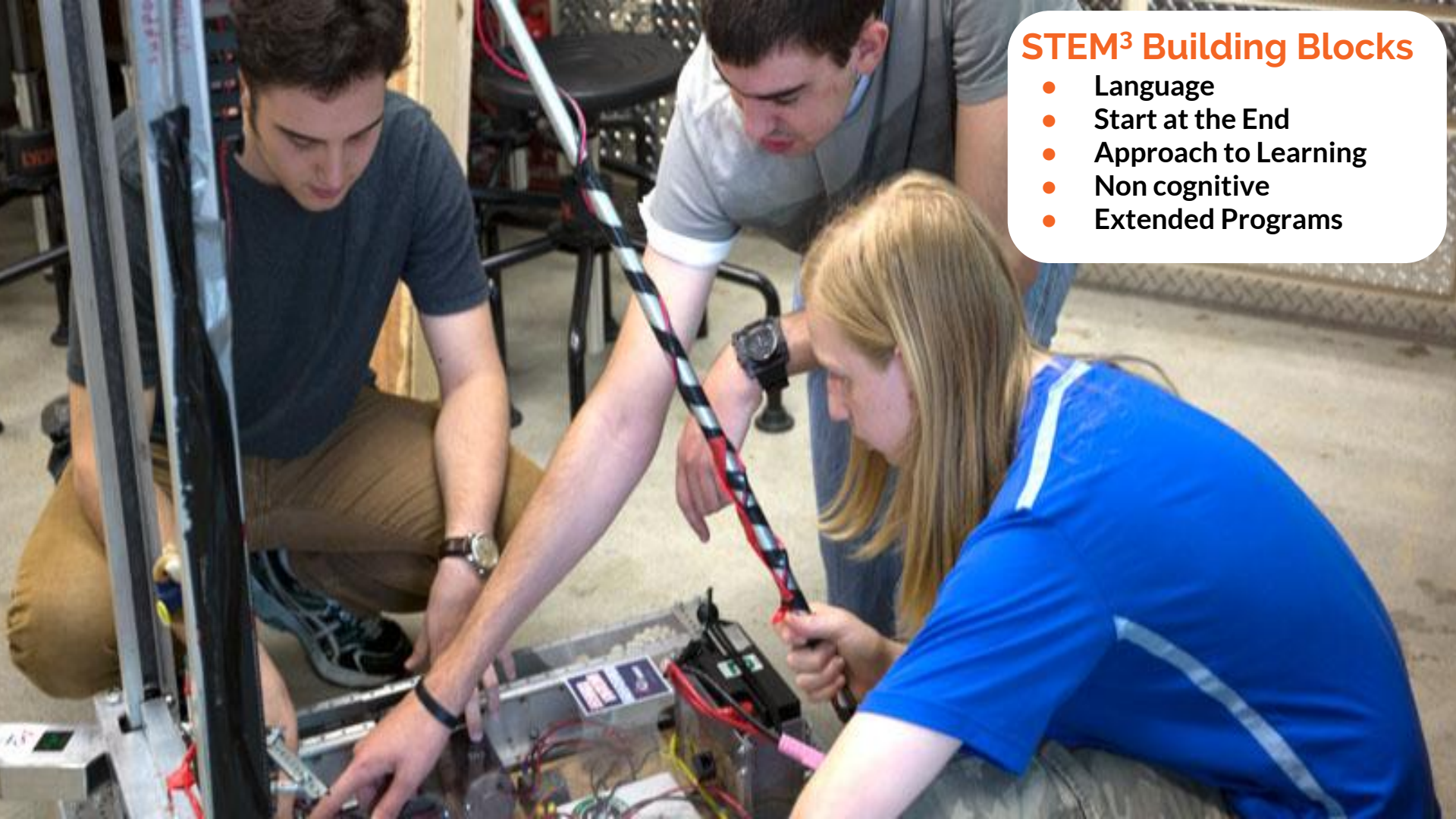
Revolution in Education

The Help Group's Response to these two Opportunities



STEM³ Academy

Goal is to improve the bad employment statistic by changing how we educate students with special needs resulting in a pipeline of students ready to capture marketplace opportunities



STEM³ Building Blocks

- Language
- Start at the End
- Approach to Learning
- Non cognitive
- Extended Programs

Language

The Language of Inability

- Traditionally special education has been about weakness rather than strengths—about where students need support and what they don't do well

  - The language itself: **special needs**, **students with disabilities**, **student weaknesses**, **learning difficulties, problems, challenges** all contribute to the image of 'less capable than —neuro-typical peers

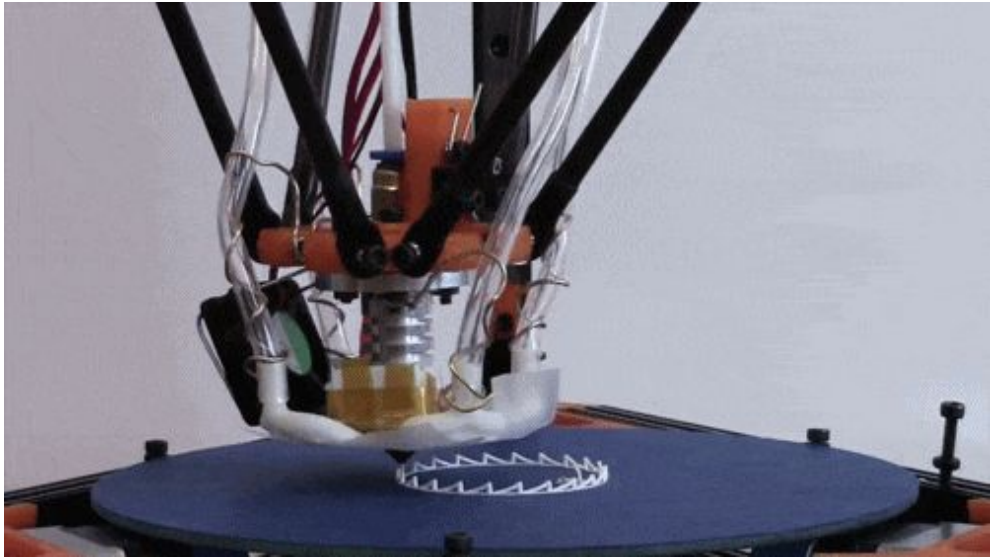
A New Language

Many of our students have natural skills and abilities that go unrecognized

- Visual discrimination
- Fixed focus
- Math focus
- Language focus
- Perseverance
- Repetition
- Logic

Start At The End

Start at the End



65 percent of children in grade school today are predicted to work in jobs that have yet to be invented

What does commerce and industry look for in an employee?

- Ability to collaborate on a team
- Decisive and being a problem solver
- Ability to plan and organize
- Ability to communicate

STEM & the Modern World

Technology has infused every aspect of our lives and livelihoods—lasers in medicine; cyclotron in physics; GPS navigation; CAD for set design; holographic paint, virtual reality and augmented reality displays

Not all STEM-related jobs require a Bachelor's degree—experience in an internship, a certification program, extracurricular projects are all valuable experience. Looking for those who can perform

Approach to learning

Our Approach

- Traditionally education has been teacher centered and involved passive learning, rather than student centered and involving active, applied or experiential learning

- Traditional education has a focus on rote learning, which is passive—we want to encourage independent learners and critical thinkers, learning by exploration and discovery

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FRC
STEM

MONOPOLY

Our Approach

- We want students collaborating and engaging as a matter of habit, not just at special times of the day

- Have them engage in project based learning, interactive and collaborative projects rather than learn in isolation

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Our Approach

- Engage in Socratic seminars and group competition builds (FIRST, VEX, Odyssey of the Mind)

- Anywhere learning—one doesn't only learn at a desk in the classroom; interactive learning; interdisciplinary projects; digital portfolios and senior projects

- Students are more committed and involved when they can participate actively

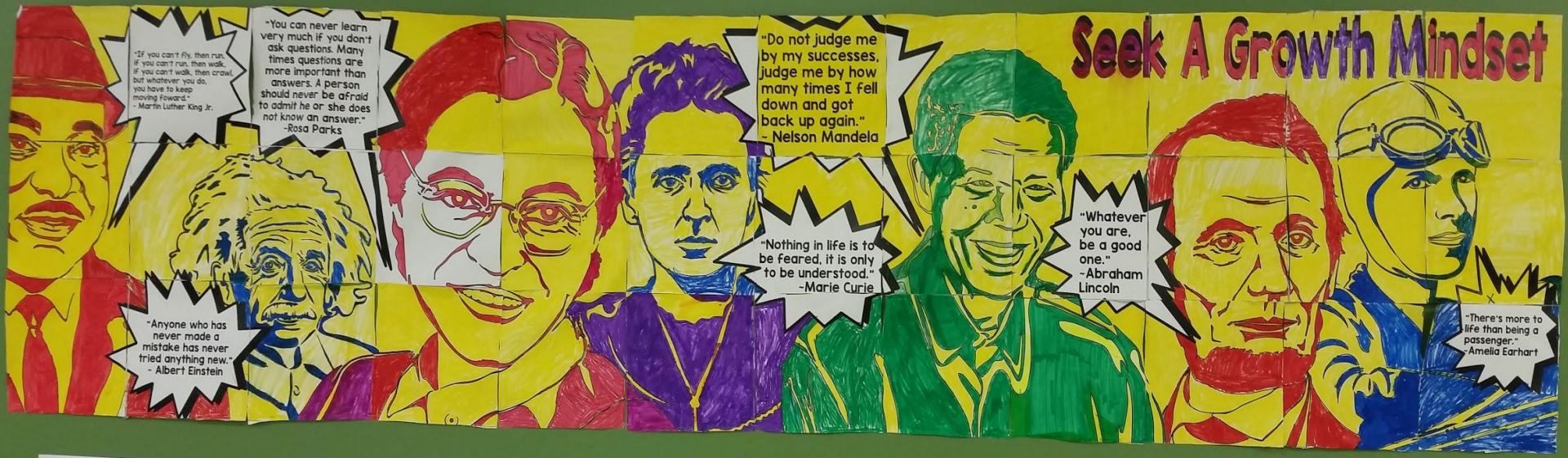
```
color c2=color(random(75),random(100),ra
12
13 for(int d=0;d<maxd;d++){
14   float n=map(d,0,maxd,0,1);
15   color newc=lerpColor(c1,c2,n);
16   stroke(random(0,255),random(0,255),ran
17   triangle(x,y,d,x,y,x);
18   ellipse(x,y,d,d);
19   rect(x,x,d,d);
20   strokeWeight(0);
21   strokeWeight(50);
22   line(x,y,x,d);
23 }//end for loop
24 }//end void draw_circ
25 void draw(){
26   draw_circ_grad(mouseX,mouseY,200);
27   //filter(GRAY);
28 filter(INVERT);
29 //filter(POSTERIZE,2);
30 filter(ERODE);
31 //filter(THRESHOLD);
32 filter(BLUR,3);
33 filter(DILATE);
34 }//end void draw
```

Non-Cognitive Approach

Essential Skills

Embed social emotional skills in the curriculum

GROWTH MINDSET

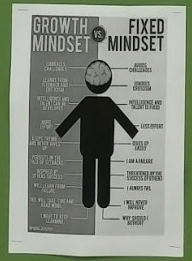


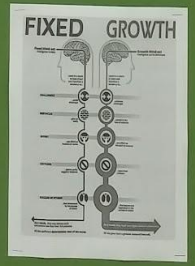
~~This is too hard~~

I **can** do **hard** things.

~~I keep messing up.~~

I am **resilient** and
I **learn** from my **mistakes**.





~~I'm so dumb.~~

I'm **learning** and
I just need **more practice**.

~~I can't do this.~~

I am going to **train my brain** in how to do this.

Extended Programs

Extended Programs

- After school classes
- Robotics Team
- Summer camps
- Internships
- Mentorships
- Career day
- College tours
- Community Innovation Fair
- Corporate Sponsorships

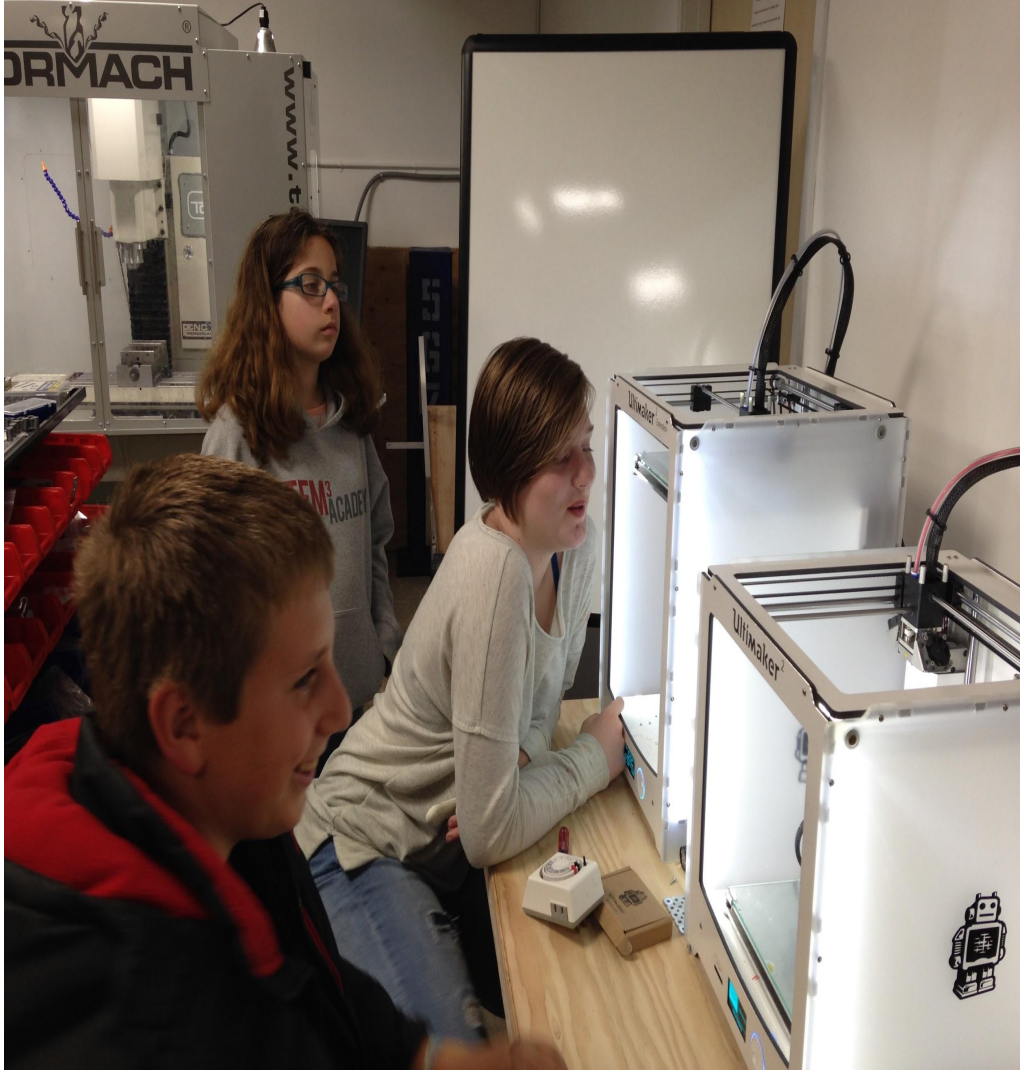
Outcomes

- Last year at STEM^3 Academy, we graduated 5 students, 4 to 4 year colleges, 3 to computer science, one to veterinary science, and 1 to Dramatic Arts—60% to computer science, 80% to the sciences

- Last year we had 4 students who scored 4s on their AP exams. This year, we have 32 students enrolled in AP classes. That's almost 50% of the entire school, and 75% of the high school! We're moving towards requiring every student to take at least 1 AP class in high school

- Last year 4 students interned in Information Technology in their senior year. This year, all 14 of our seniors will intern as a way of gaining valuable on the job training in their field of interest

Conclusion

- Build a pipeline to meet market demand for qualified workers
- Change the language we use
- Create more STEM educational opportunities
- Broaden the definition of success

What might you do?