



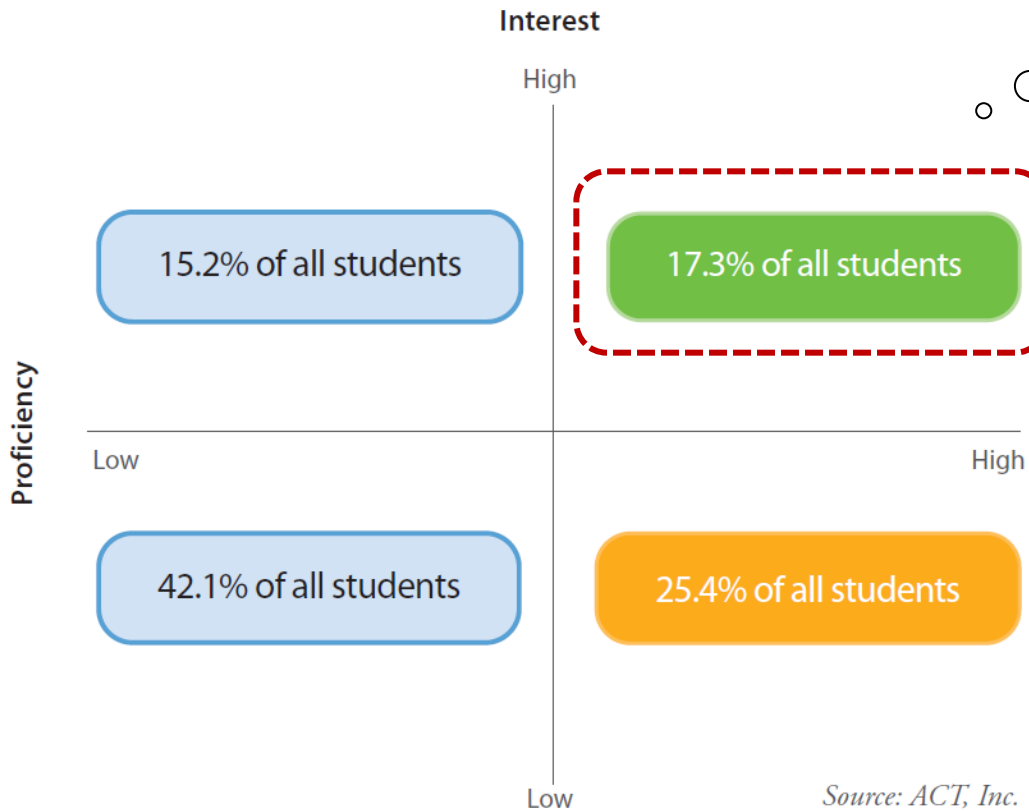
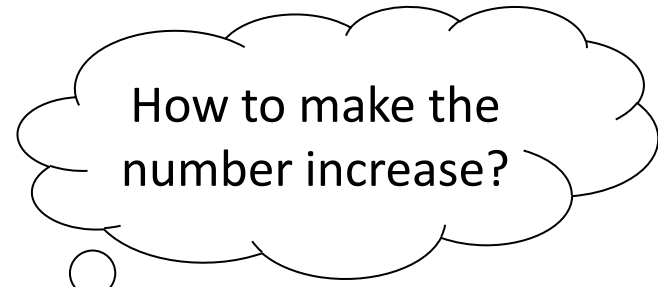
How To Realize STEM Potential Through Serious Game

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HelloApps.com

Distribution of STEM Interest and Mathematics Proficiency among 12th Graders



The number of STEM Graduates

US	15.6% ↓
China	46.7%
South Korea	37.8% ↓
Germany	28.1%

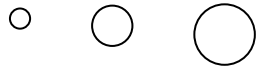
Students taking ACT test in 2008.

Source: ACT, Inc.

Increasing the number of STEM Graduates, BHEF 2010

Trial and Errors in Adoptions for STEM

2007

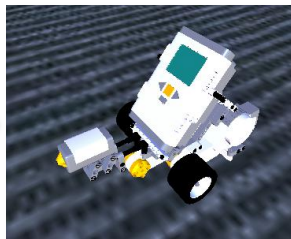


- Expensive
- Scenario Limited
- Knowledge Required

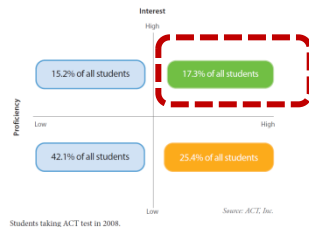
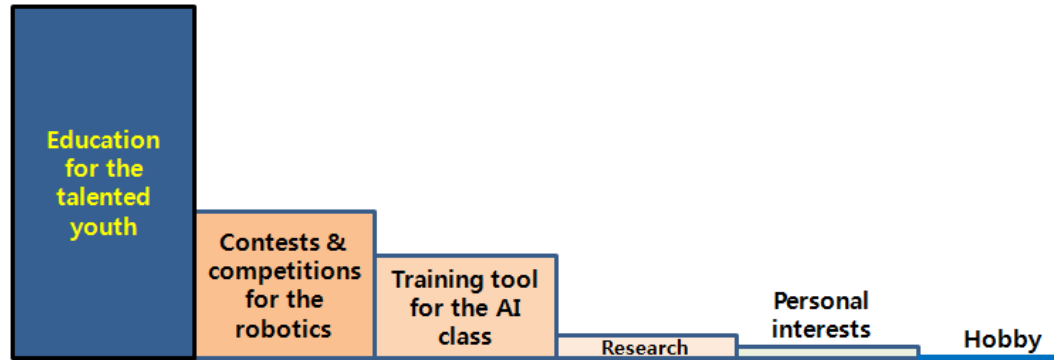
Fun...
Interesting...
Technology...

(Based on survey and feedback in Korea)

Trial and Errors in Adoptions for STEM



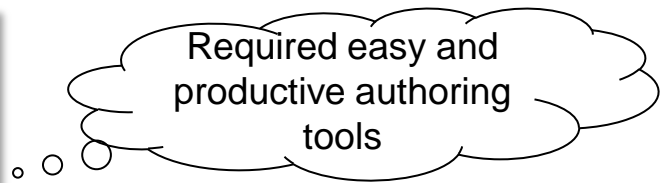
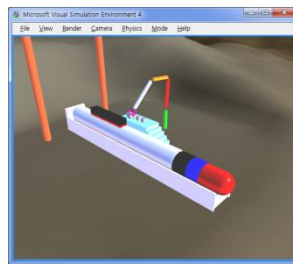
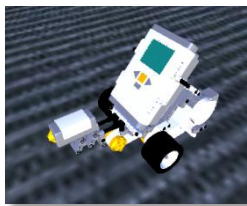
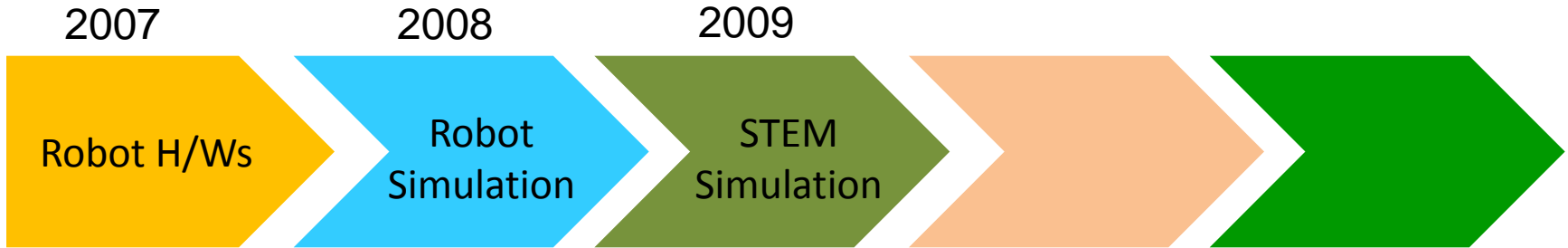
Adopt game technologies



Mostly adopted for “High Interest & High Proficiency” Group

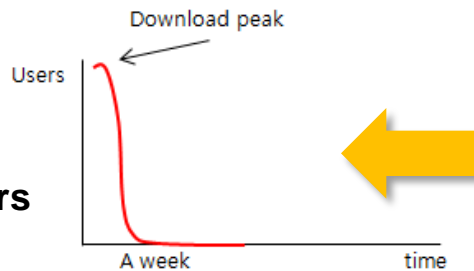
(Based on survey and feedback in Korea)

Trial and Errors in Adoptions for STEM



Scale-out scenarios from robot to STEM topics

Unmaintained users



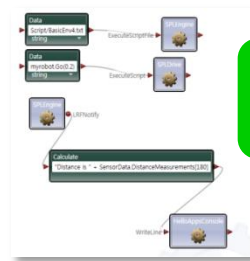
High productive tool but too hard

Very easy tool but low productive

```

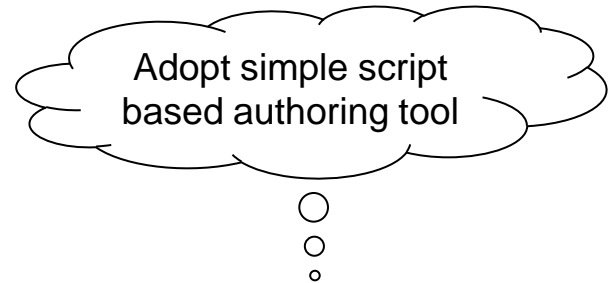
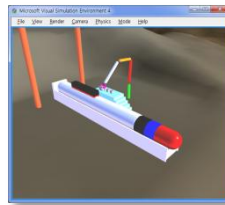
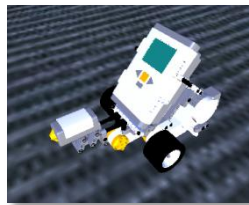
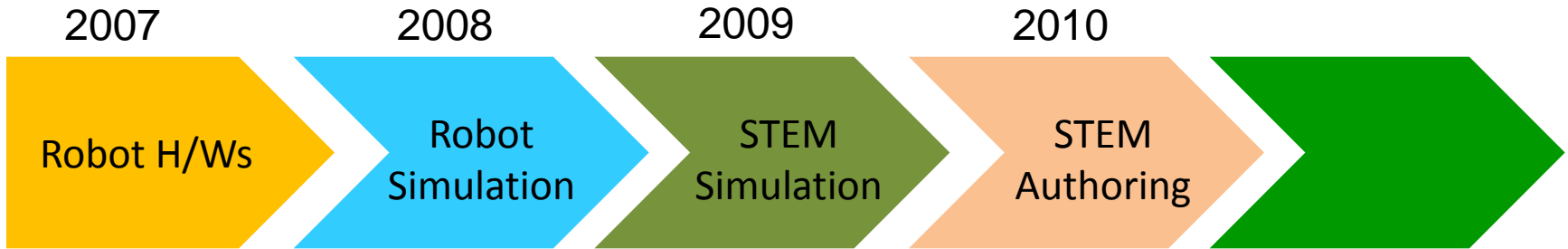
@ServiceContract
using System;
using System.ServiceModel;
using Microsoft.SDL.Act;
using Microsoft.SDL.ServiceModel;
using Microsoft.SDL.ServiceModel;
using Microsoft.SDL;
using Microsoft.SDL.Services.Subscription;

namespace SDLService
{
    [ContractAttribute]
    [ServiceContract]
    public interface ISubscriptionService
    {
        [OperationContract]
        void Subscribe();
    }
}
    
```



(Based on survey and feedback in Korea)

Trial and Errors in Adoptions for STEM



**High productive tool
Easy to learn**

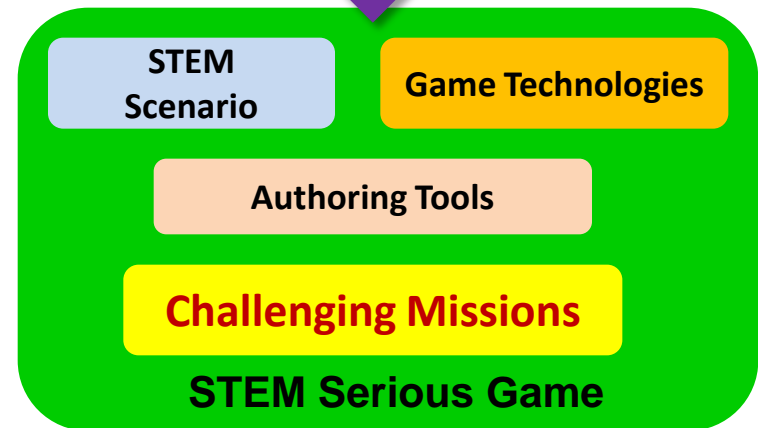
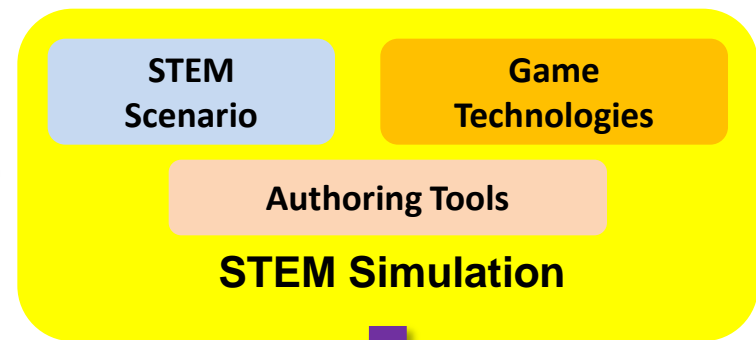
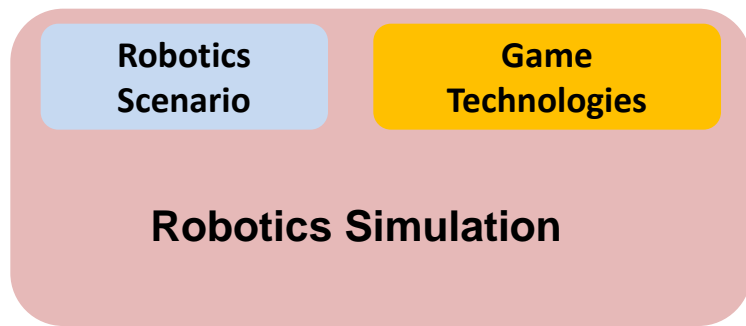
But poor motive

```

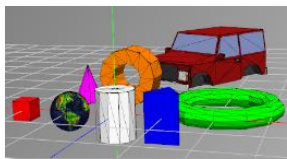
untitled*
1
2 StartSimulationEngine "SimState/basicsim.xml"
3
4 AddDifferential
5
6 FlushScript
7
8 base1.Go()
    
```

(Based on survey and feedback in Korea)

Trial and Errors in Adoptions for STEM



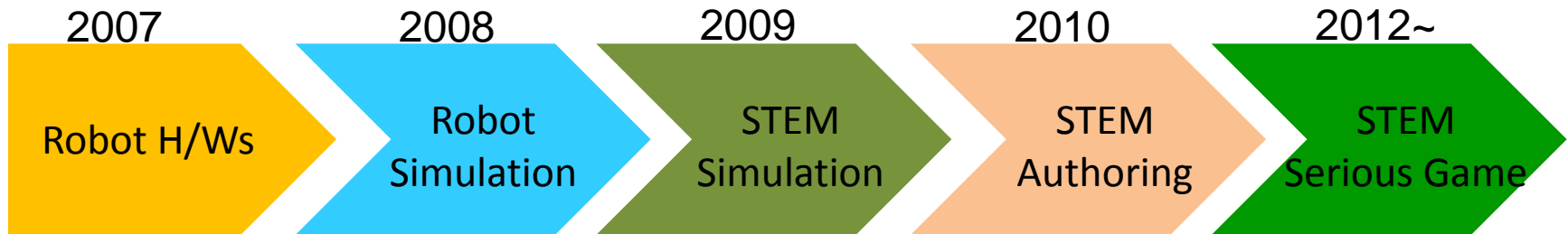
“Mission Driven” Education



Creative Activities



STEM Serious Game



Challenging Mission Goal

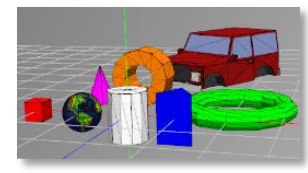
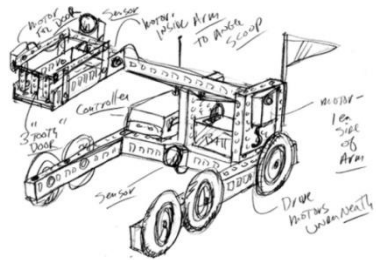
"See how science, technology, engineering, and mathematics are actually applicable to real life."

Imagine

Design

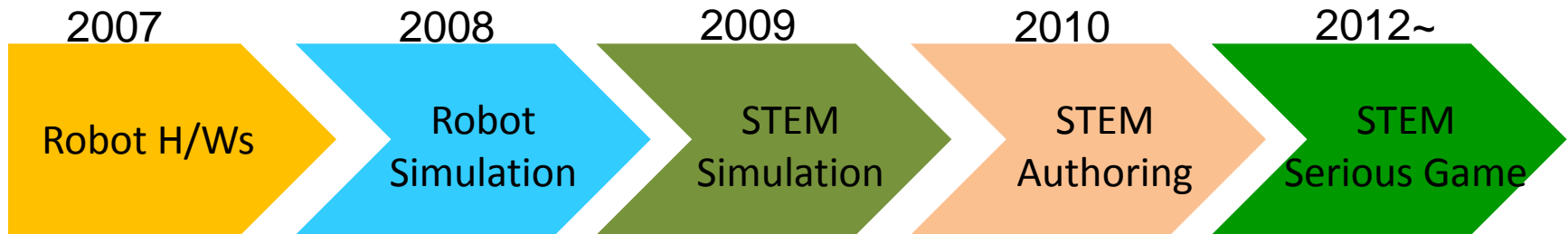
Authoring

Mission Execution

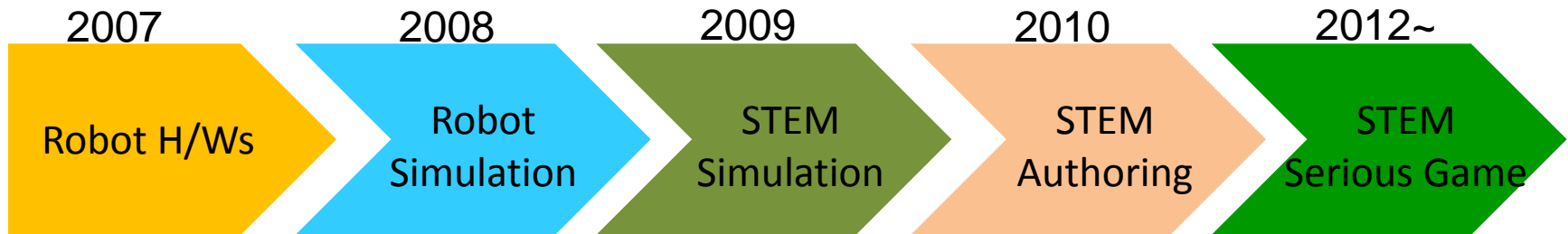


"Expose them at an early age, show them it is fun and interesting."

STEM Serious Game



STEM Serious Game



“Mission Driven”

Challenging Mission Goal

“Career Awareness”

Problem Finding & Solving

Simulated Mission Environment

Science Skills

Increase Interest



Creativity

STEM Skills



Increase Proficiency

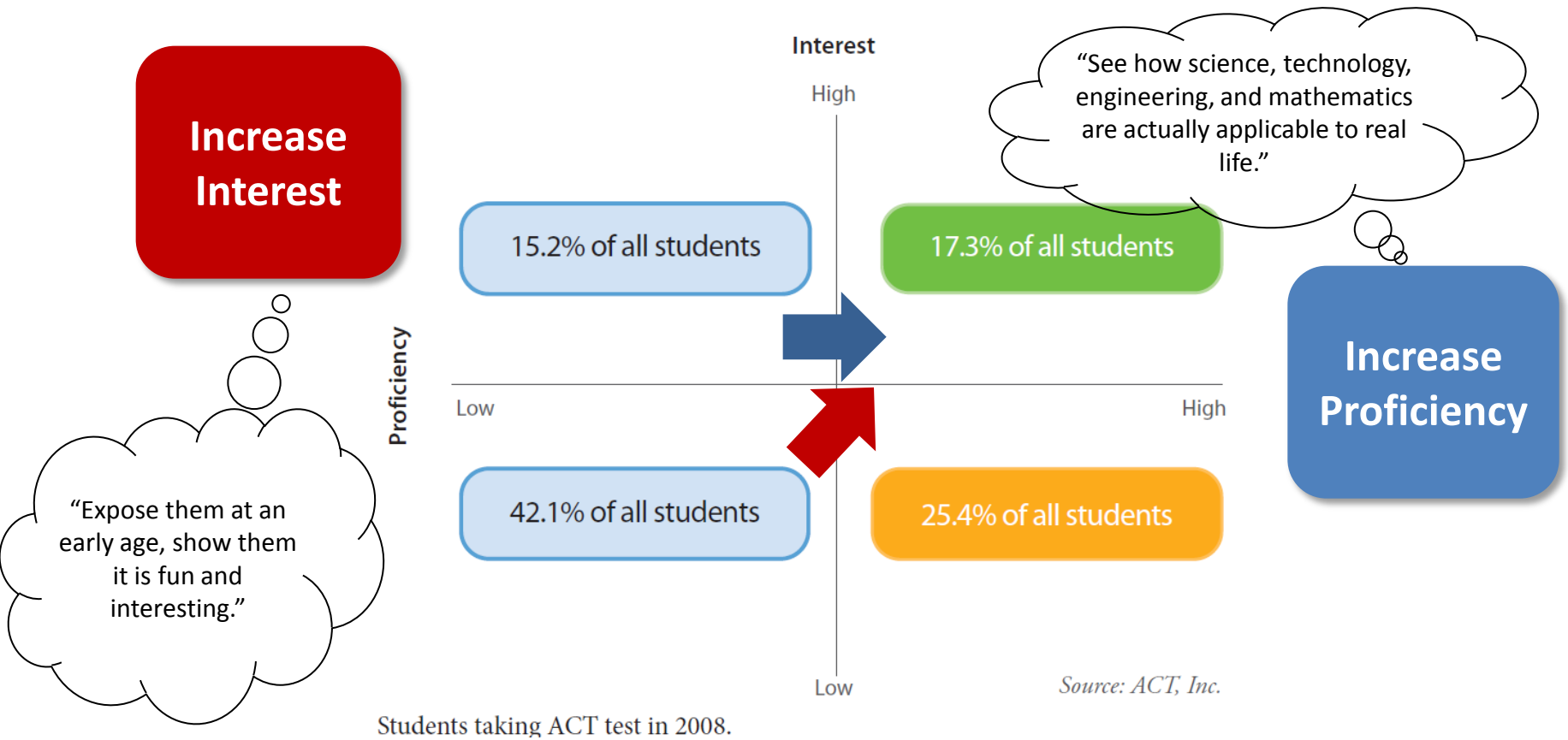
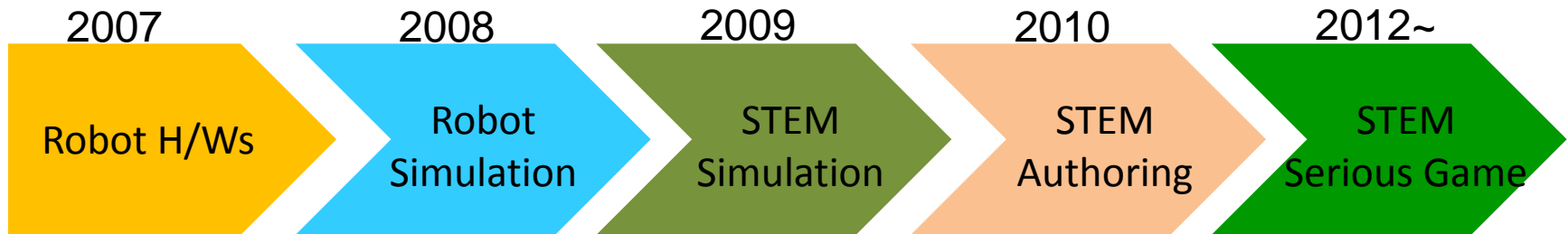
Attitude & Ability to Accomplish Challenging Tasks using STEM Skills

Engi

Ma

Em
Robots

STEM Serious Game



Sample Case for a Science Topic

Educational Items

Game Items

Assign a laboratory topic into a game mission

What shape has the Moon?

Mission

Class Goal

Suggest Condition

inquiring mind

Take a picture of alien's station on the Moon

Hypotheses

Has the Moon sphere shape?

Teamwork

STEAM Items

Build a spaceship

Visual Interest

Authoring

Calculation, Shapes, Logics

Add cameras on the spaceship

Earth, Moon, Spaceship, Camera

Texturing on the Moon

Curiosities

Execution

Teamwork

Constructivist

Launch spaceship

Creative Action

Training hand gestures

Move to the Moon

Communication skills

Take a picture

Immersion

Observe the Moon

Return to Earth

Contest

Science Skills

Reporting

Reports

Achieve Goal

Submit pictures

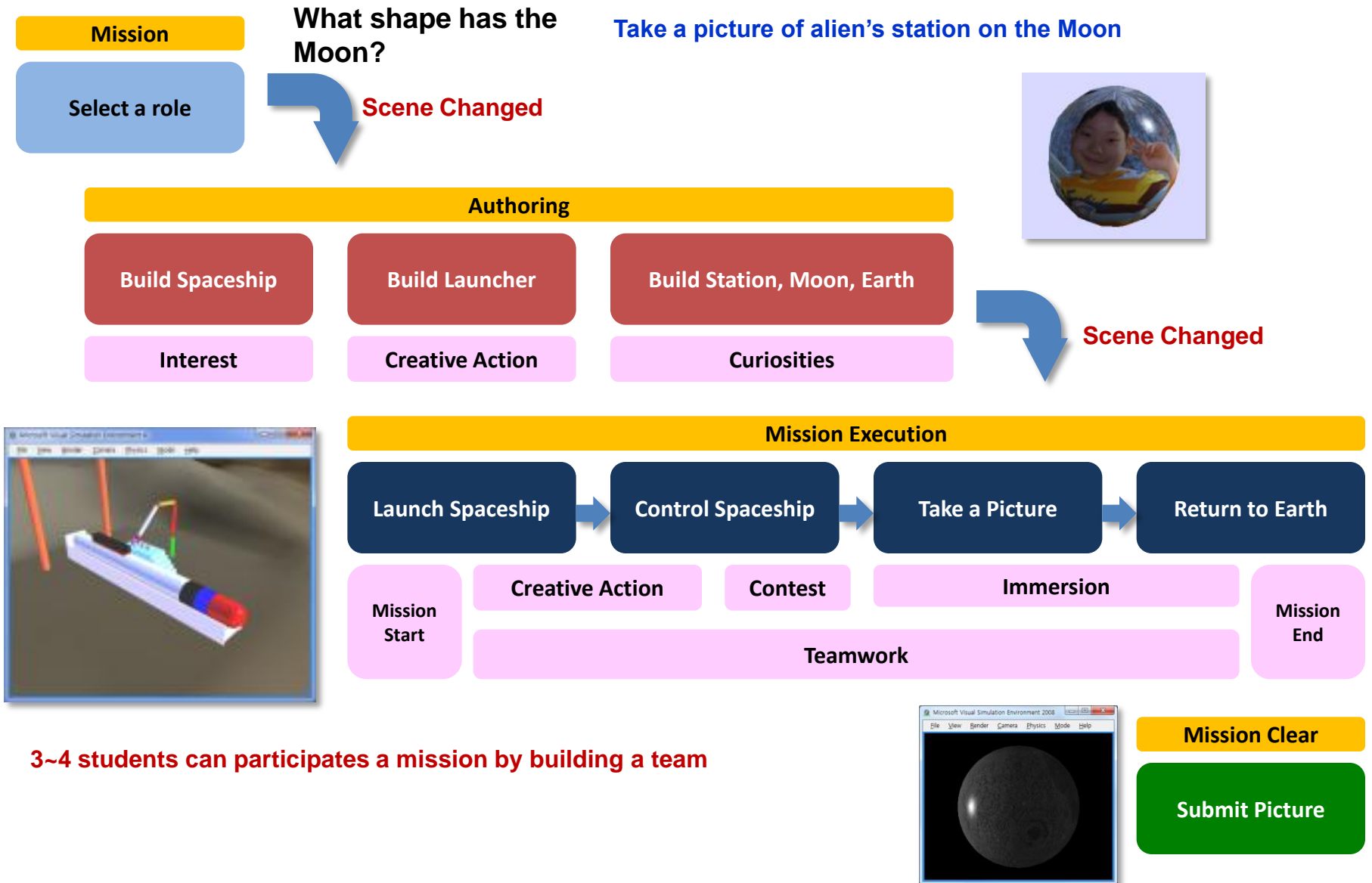
Check mission execution time

Presentation

Presentation

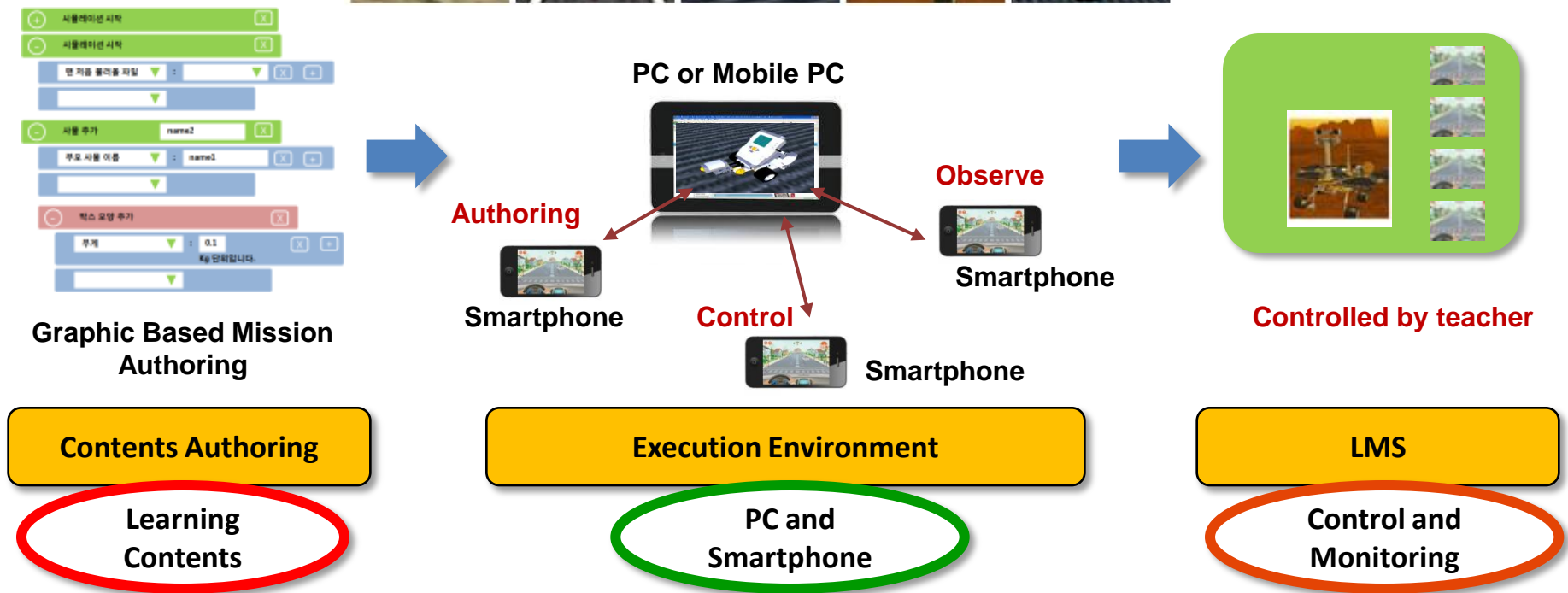
Achieve a class goal by completing game mission

How to Implement a Game



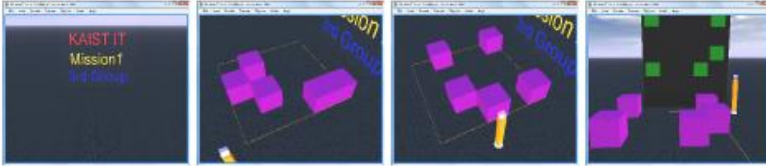
Serious Game Solution for STEM

STEAM Missions



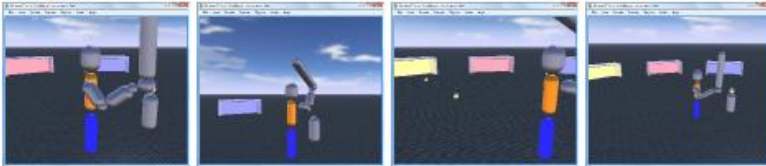
Sample Contents Created by Students

Mission1



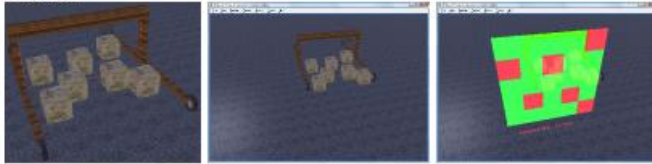
[\[Download SPL script for Mission1 \]](#) [\[Download SPLX package file for Mission1 \]](#)

Mission2



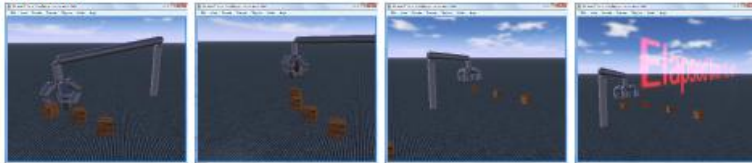
[\[Download SPL script for Mission2 \]](#) [\[Download SPLX package file for Mission2 \]](#)

Mission1



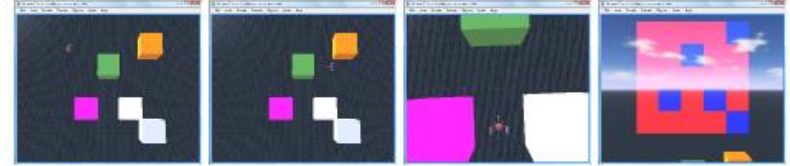
[\[Download SPL script for Mission1 \]](#) [\[Download SPLX package file for Mission1 \]](#)

Mission2



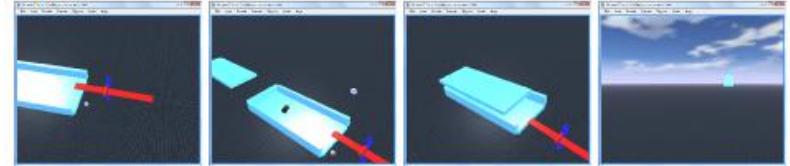
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Mission1



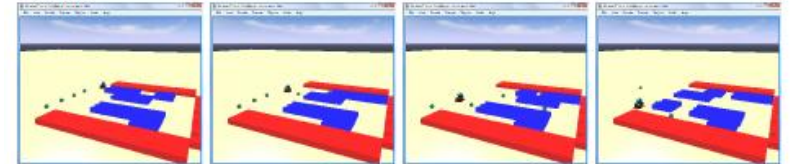
[\[Download SPL script for Mission1 \]](#) [\[Download SPLX package file for Mission1 \]](#)

Mission2



[\[Download SPL script for Mission2 \]](#) [\[Download SPLX package file for Mission2 \]](#)

Mission1



[\[Download SPL script for Mission1 \]](#) [\[Download SPLX package file for Mission1 \]](#)

Mission2



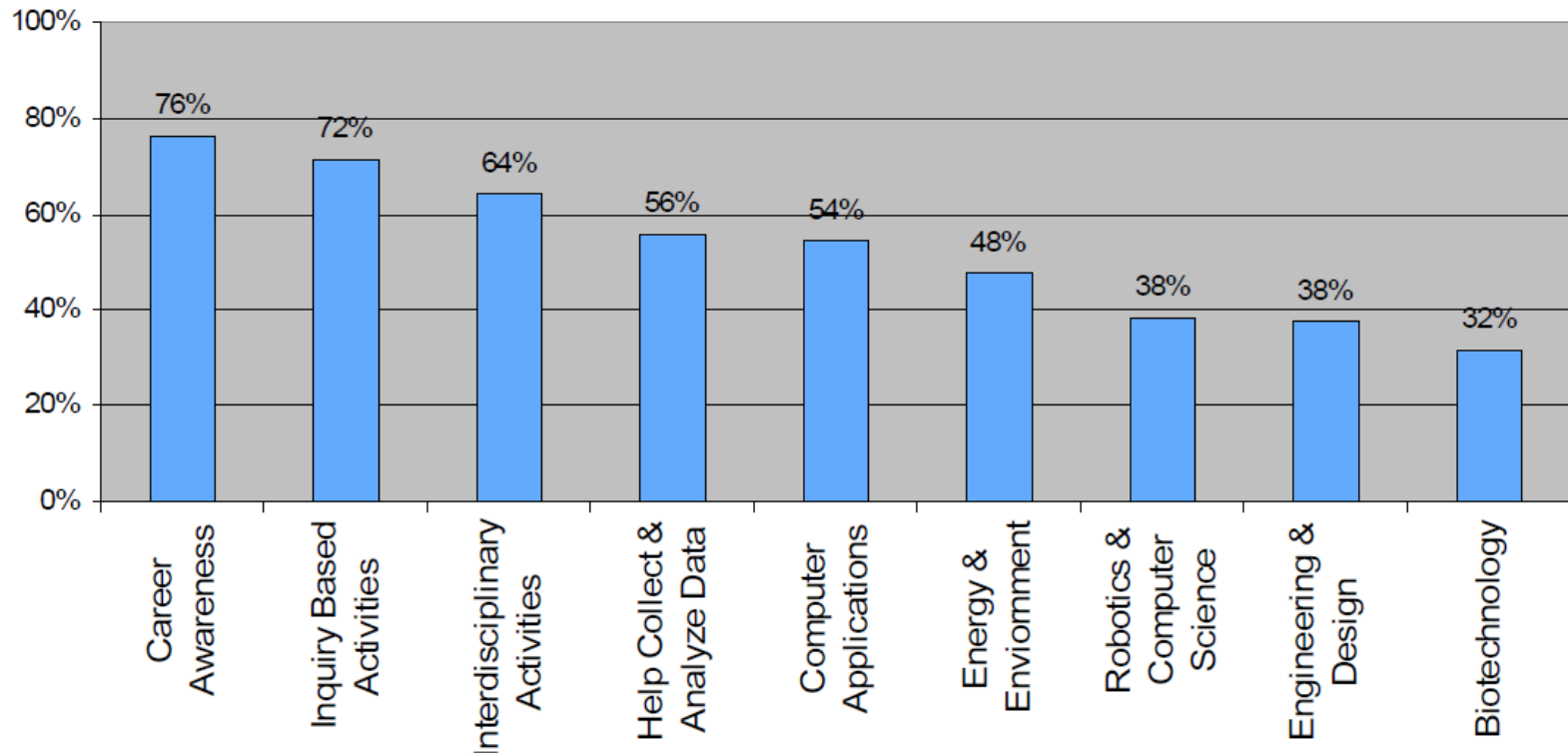
[\[Download SPL script for Mission2 \]](#) [\[Download SPLX package file for Mission2 \]](#)

Thanks

References

Interest in STEM Career Topics for More Effective Preparation of Students

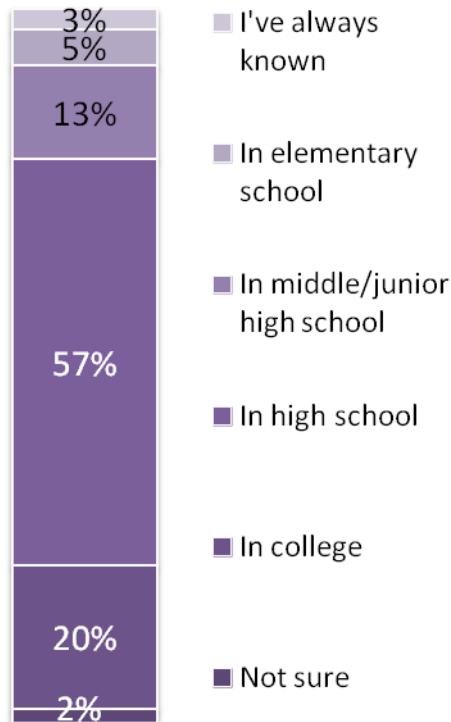
More than 75% of the teachers noted Career Awareness as a topic that would help them to prepare students for STEM careers



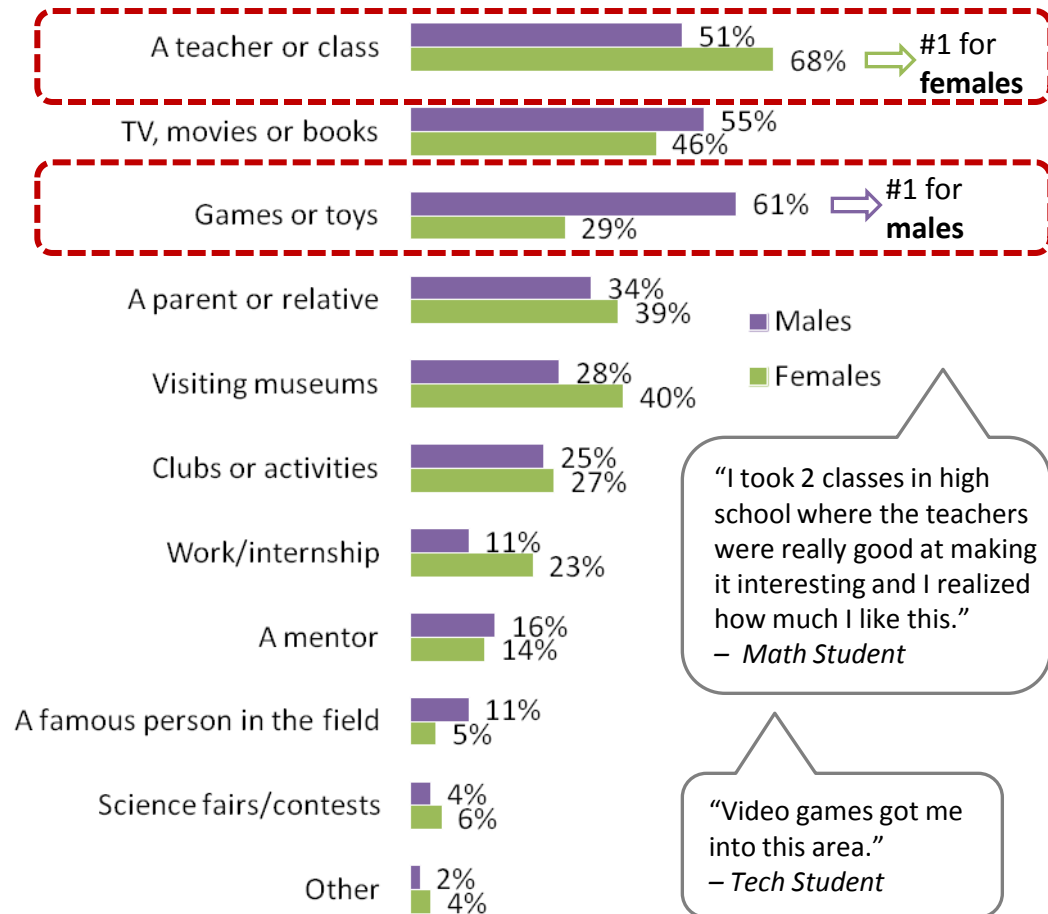
STEM Education in Southwestern Pennsylvania, CMU and IU, 2008

WHAT Got You Interested in STEM?

STEM Students: When Did You DECIDE You Wanted to Study STEM?



STEM Students: Before College, WHAT Got You Interested in STEM?



Reasons College Students Choose STEM Degrees

