prism

hosted by ROSE-HULMAN INSTITUTE OF TECHNOLOGY

January 2016
Volume 6, Issue 1

Newsletter

Special Interest Articles

- Golden Rules

Individual Highlights

- 24 Super Cool Free Science Apps
- PLTW Star Wars
- Professional Development Opportunities
- Upcoming Events

Golden Rules for Engaging Students in Learning Activities

By Nicolas Pino James, PhD *Edutopia, Dec. 2015*

When we think of student engagement in learning activities, it is often convenient to understand engagement with an activity as being represented by good behavior (i.e. behavioral engagement), positive feelings (i.e. emotional engagement), and, above all, student thinking (i.e. cognitive engagement) (Fredricks, 2014). This is because students may be behaviorally and/or emotionally invested in a given activity without actually exerting the necessary mental effort to understand and master the knowledge, craft, or skill that the activity promotes.

In light of this, research suggests that considering the following interrelated elements when designing and implementing learning activities may help increase student engagement behaviorally, emotionally, and cognitively, thereby positively affecting student learning and achievement.

1. Make It Meaningful

In aiming for full engagement, it is essential that students perceive activities as being meaningful. Research has shown that if students do not consider a learning activity worthy of their time and effort, they might not engage in a satisfactory way, or may even disengage entirely in response (Fredricks, Blumenfeld, & Paris, 2004). To ensure that activities are personally meaningful, we can, for example, connect them with students' previous knowledge and experiences, highlighting the value of an assigned activity in personally relevant ways. Also, adult or expert modeling can help to demonstrate why an individual activity is worth pursuing, and when and how it is used in real life.

2. Foster a Sense of Competence

The notion of competence may be understood as a student's ongoing personal evaluation of whether he or she can succeed in a learning activity or challenge. (Can I do this?) Researchers have found that effectively performing an activity can positively impact subsequent engagement (Schunk & Mullen, 2012). To strengthen students' sense of competence in learning activities, the assigned activities could:

- Be only slightly beyond students' current levels of proficiency
- Make students demonstrate understanding throughout the activity

continued on Page 2...

Golden Rules for Engaging Students in Learning Activities

continued...

- Show peer coping models (i.e. students who struggle but eventually succeed at the activity) and peer mastery models (i.e. students who try and succeed at the activity)
- Include feedback that helps students to make progress

3. Provide Autonomy Support

We may understand autonomy support as nurturing the students' sense of control over their behaviors and goals. When teachers relinquish control (without losing power) to the students, rather than promoting compliance with directives and commands, student engagement levels are likely to increase as a result (Reeve, Jang, Carrell, Jeon, & Barch, 2004). Autonomy support can be implemented by:

- Welcoming students' opinions and ideas into the flow of the activity
- Using informational, non-controlling language with students
- Giving students the time they need to understand and absorb an activity by themselves

4. Embrace Collaborative Learning

Collaborative learning is another powerful facilitator of engagement in learning activities. When students work effectively with others, their engagement may be amplified as a result (Wentzel, 2009), mostly due to experiencing a sense of connection to others during the activities (Deci & Ryan, 2000). To make group work more productive, strategies can be implemented to ensure that students know how to communicate and behave in that setting. Teacher modeling is one effective method (i.e. the teacher shows how collaboration is done), while avoiding homogeneous groups and grouping by ability, fostering individual accountability by assigning different roles, and evaluating both the student and the group performance also support collaborative learning.

5. Establish Positive Teacher-Student Relationships

High-quality teacher-student relationships are another critical factor in determining student engagement, especially in the case of difficult students and those from lower socioeconomic backgrounds (Fredricks, 2014). When students form close and caring relationships with their teachers, they are fulfilling their developmental need for a connection with others and a sense of belonging in society (Scales, 1991). Teacher-student relationships can be facilitated by:

- Caring about students' social and emotional needs
- Displaying positive attitudes and enthusiasm
- Increasing one-on-one time with students
- Treating students fairly
- Avoiding deception or promise-breaking

6. Promote Mastery Orientations

Finally, students' perspective of learning activities also determines their level of engagement. When students pursue an activity because they want to learn and understand (i.e. mastery orientations), rather than merely obtain a good grade, look smart, please their parents, or outperform peers (i.e. performance orientations), their engagement is more likely to be full and thorough (Anderman & Patrick, 2012). To encourage this mastery orientation mindset, consider various approaches, such as framing success in terms of learning (e.g. criterion-referenced) rather than performing (e.g. obtaining a good grade). You can also place the emphasis on individual progress by reducing social comparison (e.g. making grades private) and recognizing student improvement and effort.

Read more online at: http://www.edutopia.org/blog/golden-rules-for-engaging-students-nicolas-pino-james

24 Super Cool Free Science Apps

by Monica Burns ClassTechTips.com

1. iPad Lab Timer for Experiments (lab experiments)
2. WWF Animal App (life science)
3. Smithsonian Channel for Tablets (earth science, biology, astronomy, and more)
4. Common Core Activities with Frolyc (create your own sci ence activities or search their library)
5. Shout Science Interactive Storybook (history of the Scien tific Revolution)
6. National Parks on Your iPad (earth science, geology)
7. Hopscotch for Coding (computer science)
8. Marine Missions to Explore Ocean Science (marine biology)
9. Daisy the Dinosaur to Teach Coding (computer science)
10. Discovery Channel on iPads (earth science, marine biology, geology, and more)
11. 3D Atlas for iPads (earth science)
12. Virtual Periodic Table of Elements (chemistry)
13. Super Stretch Yoga (anatomy)
14. iPad Safety Apps (earth science, natural disasters
15. Earth Now by NASA
16. Tree Exploration on iPads (life science)
17. Ocean Science (marine biology)
18. iPad Science Fair (physical science)
19. iYoga for Anatomy (anatomy)
20. Essential Skeleton 3D (anatomy)
21. Sustainability iPad Apps (life science)
22. Eat and Move: Health Calculator (life science)
23. Rock and Mineral Identifier (earth science)
24. Healthy Eating with Whole Foods (life science)

PLTW Engineering Students Bring "Star Wars" to Life

Q&A WITH PLTW COMPUTER INTEGRATED MANUFACTURING TEACHER BENJAMIN BRZEZINSKI

PLTW teacher Benjamin Brzezinski of Niles North High School in Skokie, Illinois, challenged his Computer Integrated Manufacturing (CIM) students to apply their engineering knowledge and skills through an out-of-this-galaxy project: designing and manufacturing their own lightsaber hilts. Check out Project Lead The Way's interview with Mr. Brzezinski below.

Project Lead The Way: Why did you choose to integrate the lightsaber project into your CIM class?

Benjamin Brzezinski: First off, I'm a huge "Star Wars" fan! Earlier this school year, I was trying to think of a project that my students could do that incorporated the lathe, which is still a vital part of manufacturing. Around that time, one of my colleagues asked if I was going to try and incorporate any new projects into CIM or Introduction to Engineering Design (IED). After that conversation, he mentioned the new "Star Wars" movie, knowing I was a fan, and said, "Too bad you couldn't do a project for that." And then it hit me: The lightsaber hilt is essentially a cylindrical object! I could turn a lightsaber hilt on the lathe and add rapid prototyped attachments later on after machining was done. Perfect!

PLTW: How is this project different from what students might typically experience?

BB: Having something like a lightsaber hilt to design to cut seemed like a great idea because it captured the attention of my students, being such a pop culture buzz right now. It's about finding something to engage the students that's interesting to them but still making sure they learn the important facts about machining.

PLTW: In what ways were you able to help your students connect this project to the real world?

BB: By giving the students the project, they had more invested in it because they were the ones coming up with the original design. They had to calculate the speed and feed of the tool and material, and after all were finished, the students had to go back and figure out the material lost in the process and figure out how much money was lost through that. So: calculation of speed and feed and of material lost. They learned how much money was wasted by material loss and how to set up and run a lathe.

PLTW: How has your school and greater community reacted to the project?

BB: Check out the news piece done for the project, and you will see how much people enjoyed it. It has been a big success with the administration, students, and all of Chicagoland.
What are some of your PLTW stories and/or best practices in education? We want to know! Complete our submission form to share your story.

Read more online at: https://www.pltw.org/news/items/201512-pltw-engineering-students-bring-star-wars-life

Professional Development Opportunity

STEM Teach II begins January 2016!

College classes are free for K-12 in-service teachers! Tuition is waived and teachers will receive completion awards for each successfully completed (C or better) course or workshop – $500 for a graduate or undergraduate course, $250 for a 5-day workshop, $500 for a 10-day workshop. Textbooks or classroom materials will be covered by a stipend to the participating teacher or host institution.

Graduate and undergraduate courses are available in content areas such as: Psychology, Biology, Chemistry, Physics, Mathematics, Forensics, Earth/Space Science, and Technology. Classes are available online, face-to-face, or via a hybrid approach.

In-service teachers will register through an online process beginning on December 18, 2015 at http://www.stemteachindiana.org/teachers/. Once the courses are filled, registration will no longer be available for the current semester.

To administer STEM Teach, the Independent Colleges of Indiana (ICI) contracted with the Center for Excellence in Leadership of Learning (CELL) at the University of Indianapolis.

Upcoming Events

45th Annual HASTI Conference
Racing Toward Science Literacy In Indiana

February 3-5, 2016
INDIANA CONVENTION CENTER
http://www.hasti.org/upcoming-conference-information

Member Discounts
Remember, you can become a member of HASTI and register at the discounted member rate. Member dues are $30 for teachers and industry professionals, $15 for college students and retirees. All HASTI Memberships expire January 31 of each calendar year. You must be a current member at the time of the HASTI conference to receive the member rate. To renew your membership or to sign up as a new member, please please select the "New Members" or "Renew" tab.

Bring Your Administrator Along for FREE
Returning in 2016, if 4 people from one school attend HASTI, your Superintendent or Principal will receive a complimentary registration! Please contact the HASTI registrar at tammiec@cmcglobal.com, 877-427-8499 to take advantage of this special offer.

If you have any questions or concerns regarding registration, please contact the HASTI Registrar at 877-427-8499 or via email at tammiec@cmcglobal.com.

What PRISM Can Do For You!

- Easily find the perfect teaching and learning resources from our library of over 4,000.
- Save a list of your favorite resources for quick retrieval.
- Create and share lesson plans that teach your subjects utilizing your favorite resources.
- Develop online classrooms with interactive assignments, lessons, quizzes and more!
- Store your classroom materials online so that they are available to you from any computer.
- Reach your students more effectively by using web media for the digital age.
- Earn PGP points by completing PRISM led online Moodle course – either Beginning Moodle or Intermediate Moodle courses are available to you at no cost several times throughout the year.
- Select from free learning resources that emphasize visualization, rich context, staged-problem solving, and electronically enabled collaboration / communication.
- Augment your own dynamic presence in the classroom with teaching tools that mirror the skills needed for success in higher education and the 21st Century workplace.

*Through our strong support from the **Lilly Endowment** and others, we are constantly growing and improving. Check our site regularly to see what new resources you can use in your classroom.*

www.rose-prism.org