Preschoolers & STEM: Developing Curiosity

Course number: PRDV 73726
Title: Preschoolers & STEM/STEAM: Developing Curiosity
Credit:1
Location: Online
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(Note: When contacting me by email, please state the course name in the subject area.)

Course Overview

Course Description:
This course is designed for early childhood educators and specialists. Through *Special Topics*, the course explores the development of math and science curiosity in young children. Emphasis is placed on STEM and STEAM in the PreK classroom.

Course Objectives/outcomes
Participants will:
Explain the importance of developing Math and Science Curiosity as it relates to the Massachusetts Curriculum Frameworks, and the PRE-K Standards.
Define curiosity and what that looks like in young learners
Explain how young learners, learn about science and math
Differentiate between STEM and STEAM
Describe the implications of STEAM in the PreK classroom
Explain strategies to help families' foster curiosity of the math and sciences at home
Describe the impact of STEAM on the PreK classroom
Demonstrate the use of STEAM in the PreK classroom

Course Expectations:
Online attendance is mandatory, posting several times throughout the week. Refer to the Discussion Board Rubric. In the event of an unplanned absence, it is the responsibility of the student, at the discretion of the instructor to complete all missed work. Note: Discussions cannot be made up.
Participants will come to the Discussion Board, prepared for in depth discussions and ready to participate actively in the online discussion forum, throughout the four weeks including the final week.
One grade will be deducted for any late assignments not cleared by the instructor.
Assignments may be resubmitted with prior approval from the instructor.
A final project is required and due on or before the last day of class, no exceptions.

Course Content/Outline:
Description: This course is heavily reliant upon Discussion Board posts. Each week begins on a Monday and has a Guiding Question (GQ) Assignment, which typically has several parts. Every student is expected to provide their own initial response to the GQ, and continue the discussion through subsequent posts to the group, utilizing the readings. (See the Discussion Board Rubric)

Week 1: **The Importance of Developing Curiosity**

Description: We will explore The Importance of Developing Curiosity through our readings, podcasts and videos. Refer to the assigned Guiding Questions before and as you read, think about the natural curiosity in young learners. When you post, explain the importance of developing math and science curiosity in preschoolers, and the impact that natural curiosity has upon learning.

Required Readings or Videos

Engel, S. (2011, Aug 18). The Hungry Mind: The Origins of Curiosity. Retrieved from https://www.youtube.com/watch?v=Wh4WAdw-oq8

Raghavan, R. (2015, Feb 23). Sparking Curiosity & Nurturing Creativity. Retrieved from http://tedxtalks.ted.com/video/Sparking-Curiosity-Nurturing-Cr

Murdoch, K. (2014, Nov 13). The power of ummmm... Retrieved from http://tedxtalks.ted.com/video/The-power-of-ummmm...-%7C-Kath-Mu;search%3Anurturing%20curiosity

Perry, B. D. (2001, March). Curiosity: The Fuel of Development. Retrieved from http://www.scholastic.com/teachers/article/emotional-development-curiosity-fuel-development

Engel, S. (2013, February). The Case for Curiosity, Volume 70, Number 5, Pages 36-40, Retrieved from http://www.ascd.org/publications/educational-leadership/feb13/vol70/num05/The-Case-for-Curiosity.aspx. ISBN: 9780151157938

O'Toole, V. R. (2013, May 3). Why Curiosity Is The Most Important Skill To Teach Your Child. Retrieved from http://www.howtolearn.com/2013/05/why-curiosity-is-the-most-important-skill-to-teach-your-child

Week 2: ***Why STEM/STEAM?***

Description: We will examine STEM and STEAM, through our readings and viewings. Refer to the assigned Guiding Questions before and as you read. We will provide resources that will enable you to incorporate STEAM into your own classroom.

Explain the relationship between STEM and STEAM.

Identify how STEM becomes STEAM, and differentiate between what STEM and STEAM in the PreK classroom setting.

Required Readings or Videos

Massachusetts Department of Education. (2006, October). Pre-K Science, Technology and Engineering Standards. Retrieved from http://www.mass.gov/edu/docs/eec/2013/20131009-pk-sci-tech-standards.pdf

Jolly, A. (2014, November 18). STEM vs. STEAM: Do the Arts Belong? Retrieved from http://www.edweek.org/tm/articles/2014/11/18/ctq-jolly-stem-vs-steam.html

Killins, S. (2014, November). Teaching STEM in Preschool, Really? Retrieved from http://www.jackstreet.com/jackstreet/WMBK.RTSTEM.cfm

William, J. A. (2012, May 23). Wouldn't It Be Cool to Get More Kids Excited About STEM? Retrieved from http://www.huffingtonpost.com/william/wouldnt-it-be-cool-stem-education_b_1376435.html

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Sneideman, J. M. (2013, December). Engaging Children in STEM Education EARLY! Retrieved from http://naturalstart.org/feature-stories/engaging-children-stem-education-early
Katz, L. G. (2010). STEM in the Early Years. Retrieved from http://ecrp.illinois.edu/beyond/seed/katz.html
Flores, J. (2014, January 14). Growing with S.T.E.M. Retrieved from https://www.youtube.com/watch?v=ADPXaUFcF1Y

Week 3: ***STEAM - A Look at Science & Math through the Arts***
Examine Science and Math through the Arts
Explain how children can learn math and science by studying the arts.
Identify ways in which children are natural scientists and how that natural ability can be used in the classroom.
Explain why STEAM belongs in the Prek-2 classroom.

Required Readings or Videos

The Official Blog of the U. S. Department of Education. (2013, May 21). Young Children Learn Math Through the Arts. Retrieved from http://www.ed.gov/blog/2013/05/young-children-learn-math-through-the-arts
Gleiser, M. (2013, October 30). Every Child Is Born a Scientist. Retrieved from http://www.npr.org/blogs/13.7/2013/10/30/241826390/every-child-is-born-a-scientist
Ludwig, M., & Song, M. (2015, January 20). Wolf Trap Institute Unites the Arts and STEM in Early Childhood Learning. Retrieved from http://www.wolftrap.org/~/media/files/pdf/education/stemartsstudy_onepageoverview.pdf?la=en
Pomeroy, S. R. (2012, August 22). From STEM to STEAM: Science and Art Go Hand-in-Hand. Retrieved from http://blogs.scientificamerican.com/guest-blog/2012/08/22/from-stem-to-steam-science-and-the-arts-go-hand-in-hand
Koester, A. (2015, August 18). All Things STEAM. Retrieved from http://showmelibrarian.blogspot.com/p/all-things-steam.html
Zimmitti, M. (2012, October). STEM in Early Childhood https://edsolutionsllc.files.wordpress.com/2012/10/stem-content-package.pdf
Garin, N. (2015, March 10). Rodger Ashworth Brings Arts to Local Science and Technology Education: Bringing STEAM to the Mainstream. Retrieved from http://www.utsandiego.com/news/2015/mar/10/rodger-ashworth-steam-washington-elementary

Week 4: ***STEM & STEAM in Action & Bringing the Excitement Home***
STEM and STEAM in Action
Examine how school across the country are implementing STEAM.
Identify ways in which STEAM could be implemented into the PreK-2 classroom.
Explain how STEAM can help children develop math and science skills.
Examine the activities that children participate in during their time after school hours, and how this information provides us with insight into our own planning and expectations.

Required Readings or Videos

Grabowski, D. W. (2013, February 12). Exploring STEM Concepts in the Early Childhood Classroom. Retrieved from https://www.youtube.com/watch?v=HglYz0h2n2E

Discovery Learning Academy. (2013) Discovery Mathematic & Science Academy: Why STEM in Preschool? Retrieved from http://www.discoverylearningacademytx.com/#!why-stem/ccme

McLennan, D. P. (2014, October/November). Making Math Meaningful for Young Children, Teaching Young Children, vol. 8 (no 1). Retrieved from http://www.naeyc.org/tyc/files/tyc/Making%20Math%20Meaningful.pdf

Dewar, G. (2012). Preschool science activities How to nurture your child's interest in the natural world. Retrieved from http://www.parentingscience.com/preschool-science-activities.html

Kramer, M. (2015, March 02) Disney's 'Miles from Tomorrowland': A Space Romp for Kids with Real Science: Imagination in Math & Science. Retrieved from http://www.space.com/28677-miles-from-tomorrowland-disney.html

Wolf Trap Media. (2011, April 20). Wolf Trap Launches Early Childhood STEM (STEAM) Learning Through the Arts Program. Retrieved from https://www.youtube.com/watch?v=uoKDuyldK9M

LEGO® Commercial- Inspire Imagination and Keep Building. (2014, November 26). https://www.youtube.com/watch?v=BfhV3Q4LJPM

Boston Children's Museum. (2011). Sprouts, Science, Technology, Engineering & Math. Retrieved from http://www.bostonchildrensmuseum.org/sites/default/files/pdfs/STEMGuide.pdf

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Rubric for Asynchronous Discussion Participation

A <u>Quality of Postings Indicator</u>

Asynchronous discussion enhances learning as participants share their ideas, perspectives, and experiences with the class. Participants develop and refine their thoughts through the writing process, plus broaden their classmates' understanding of the course content. Each weekly discussion is organized around the Guiding Questions; which participants must respond to. Participants will use the following rubric to improve the quality of their discussion contributions.

Discussion Board Rubric

There are five criteria, the Initial Post, Additional Posts, Details in Each Post, The Quality of Information in Response to Other's Posts, and The Frequency of Weekly Discussion Posts. The highest amount of points that can be earned in one week, for a score of excellent, is a score of 20 points.

First Criteria

First criteria, the Initial Post, responds to the Guiding Question or GQ. This is your response to the question following the completion of readings. The initial post fully addresses the Guiding Question or questions. The post demonstrates a proficient understanding, and the score would be 4 points.

An Initial Post that addresses the topic Guiding Question or GQ and shows above average understanding scores 3 points.

An Initial Post that addresses the topic Guiding Question or GQ and shows adequate understanding receives an adequate score of 2 points.

An Initial Post that addresses the topic Guiding Question or GQ and shows Posts not tied to the topic, or no post at all and is found unacceptable and scores 1 to 0 points.

Second Criteria

Second criteria, additional posts, addresses the need for posts following the Initial Post. Additional posts occur throughout the weekly discussions: Additional postings focus on your response to other's while you are reading, and or following the completion of weekly readings or videos. The additional posts build on other's posts and comment analytically. The additional posts quote directly from other's posts, and the score would be 4 points.

Additional posts, which follows the Initial Post, builds on others posts and comments analytically, yet does not directly quote from other's post, scores 3 points.

Additional posts, which follows the Initial Post, respond to others posts, yet lacks depth and without quoting directly or indirectly from other's post, scores 2 points.

Additional posts, which follows the Initial Post, yet lacks depth and without quoting directly or indirectly from other's post, and comments may not relevant to the discussion, and is found unacceptable and scores 1 to 0 points.

Third Criteria
Third criteria focus on details in each post and addresses the requirement for highly detailed and correct posts. Posts throughout the week would possess three or more quotes from readings, podcasts or videos to support your statements and the score would be 4 points.

Posts throughout the week are detailed and correct. Quotes taken from readings or videos are utilized to support statement at least one to two times and scores 3 points.

Posts throughout the week are somewhat detailed and correct. Quote are not utilized from readings or videos to support statements yet refers to readings and scores 2 points.
Posts throughout the week respond to others with few details or facts. No quotes or references from readings or videos are used to support statements and is found unacceptable and scores 1 to 0 points.

Fourth Criteria
Fourth criteria refer to the quality of information in response to others posts. The posts a responsible for referring to what others have written and provides details from information gathered within the course and encouraged new ideas, and the score would be 4 points.

Posts refer to what others have written, provides some details from information gathered within the course and scores 3 points.
Posts refer only to what others have written, does not provide information gathered within the course and scores 2 points.
Posts do not refer to what others have posted and are found unacceptable and score 1 to 0 points.

Fifth criteria
Fifth criteria refer to the frequency of weekly discussion posts. To have a dynamic class, each participant is encouraged to share their voice, opinions, and reactions to the content and how the new content has impacted upon their thinking and classroom practices. Posts are essential and are equal to class participation. Being present often ensures that your voice is heard. Posting at least 7-8 times throughout the week is essential, and the score would be 4 points.

Posts at least 5-7 times throughout the week and shows good effort, scores 3 points.
Posts at least 3-4 times throughout the week and shows acceptable effort, scores 2 points.
Posts 0-2 times and shows unacceptable effort, scores 1 to 0 points.

Note: All Discussion Board rubric points are evaluated on a 4-3-2-1-0 basis. The highest score for each Discussion (4) would be 20 points or a total of 80 points.

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Participants will review readings/viewings, by analyzing the content for information, what is interesting, and what is new, and what is considered the pros and cons of the information. Participants should justify their analysis, providing their own opinions, not just quote information. However, your opinion must be backed up by quoting from the readings/viewings.
What to Consider when posting:
•Guiding Questions (GQ)
•Initial posting
•Refer to at least two specific points, from the article or reading.
•Conveying new information
•Contrasting earlier information learned in the course of new information (after week1).
•Convey information from the read, watch, listen information gathering, to personal experiences.
•Consider the importance of the final post to the Discussion board
•Discussion at a *critical level is not just facts from information gathering, but rather provides supporting evidence (see below).
•Discussion at a critical level means discussing, for example, the following:
•Opinion of the facts gathered or facts mentioned by others in the discussion group
•Why the opinion is held
•What is wrong with the fact/s mentioned
•Are the points, facts, opinions, consistent and or inconsistent with the material presented so far
•What are the implications for the future, consistencies, and or inconsistencies within the readings or videos?

Note: Participants will review readings/viewings, by analyzing the content for information, what is interesting, and what is new, and what is considered the pros and cons of the information. Participants should justify their analysis, providing their own opinions, not just quote information. However, your opinion must be backed up by quoting from the readings/viewings.

Final Project – Due on or before the last day of class
Participants are required to create a Final Project. The Final Project should address how the course content has influenced their thinking. The Final Project can be a tool to be used by you for professional purposes, a presentation or an activity. It should be short, for example, no more than 20 slides, concise, and cite from course content. DO NOT provide an overview of the course content.
*Format choices:
1.PowerPoint (Visual & Audio) might be useful if the intent is to share the information.
2.A Prezi (instead of a PowerPoint)
3.A Podcast may be useful to create a report, much like a newscast **
4.Writing a 10-page double-spaced APA style paper. One page of the paper may include a Wordle.
5.Or any other application that you choose to create your Final Project.

**Note: If a participant chooses to create a Podcast, a summary of the podcast and sources cited, using APA style guidelines is required.

Rubric for the Final Project

Five criteria for the final project are as follows: Question, Information, Quotes and Encourages new ideas.

First criteria, the question

If the question directly relates to the course topics and the work that you do, this question earns a score of 4 points.
If the question is somewhat related to the course topics, and the work that you do, this question earns a score of 3 points.
If the question indirectly relates to the course topics, and the work that you do, this question earns a score of 2 points.
If the question does not directly relate to the course topics, and or the work that you do, this question earns a score of 1 to 0 points.

Second criteria, the information

If the information is highly detailed and correct, you earn a score of 4 points.
If the information is somewhat detailed and correct, you earn a score of 3 points.
If the information has some detail and somewhat correct you earn a score of 2 points.
If the information lacks detail, and or is not correct, you earn a score of 1 to 0 points.

Third criteria, how analytical is it

If the information is analytical and demonstrates a proficient understanding, you earn a score of 4 points.
If the Information is analytical and demonstrates above average understanding, you earn a score of 3 points.
If the Information is analytical and demonstrates an acceptable level of understanding, you earn a score of 2 points.
If the Information is not analytical and or demonstrates a poor understanding, you earn a score of 1 to 0 points.

Fourth criteria, using quotes

If 4 quotes or more are used to support statements/assertions you earn a score of 4 points.
If 3 quotes or more are used to support statements/assertions you earn a score of 3 points.
If 2 quotes or more are used to support statements/assertions you earn a score of 2 points.
If quotes are not used, or 1 quotes are used to support statements/assertions you earn a score of 1-0 points.

Fifth criteria, encouraging new ideas or new thinking

If the final project responds to the final project question and responds to misconception, new ideas or new thinking you earn a score of 4 points.

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If the final project responds to the final project question and responds somewhat to misconception, new ideas or new thinking you earn a score of 3 points.
If the final project responds the final project question and responds to misconception yet does little to encourage new ideas or new thinking you earn a score of 2 points.
If the final project does or does not respond to the final project question, and does or does not responds to misconception, or new ideas or new thinking you earn a score of 1 to 0 points.

College Policy Regarding Academic Honesty
Integrity is essential to academic life. Consequently, students who enroll at Framingham State College agree to maintain high standards of academic honesty and scholarly practice. They shall be responsible for familiarizing themselves with the published policies and procedures regarding academic honesty. Refer to *FSU Graduate Catalog, Student Conduct section, page 7 at: http://www.framingham.edu/graduate-and-continuing-education/documents/grad-catalog-0910.pdf*.

Research
Additional supporting information can be researched at the Framingham State University Online Library. Just logon to you FSU My Campus account and go to the tab that says Library.

Academic Accommodations Policy
Framingham State University offers equal opportunities to all qualified students, including those with disabilities and impairments. The University is committed to making reasonable accommodations as are necessary to ensure that its programs and activities do not discriminate, or have the effect of discriminating, on the basis of disability. Academic Support serves students with learning and psychiatric disabilities as well as students with visual, mobility and hearing impairments. For further information about this, please visit the website at: https://www.framingham.edu/academics/center-for-academicsuccess-and-advising/or contact Ms. LaDonna Bridges, Director of Academic Support/Disability Services, in the Center for Academic Support and Advising (CASA) at 508-626-4906 or lbridges@framingham.edu.

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