UNIVERSITY OF NORTH DAKOTA

PROFESSIONAL DEVELOPMENT FOR EDUCATORS

Transformative Teaching for Science
Course at a Glance

Instructor/Presenter: Christopher J. Felege
Dates: Enroll anytime and complete in 4 months
Number of Graduate Professional Development Credits: 3

Introduction

- This course seeks to familiarize educators with various methods of teaching science, and then align those methods with the best and most appropriate outcomes according to Bloom's Taxonomy. Educators will work to transform their current teaching material into more active-learning formats, or develop new material, all aligned with appropriate State Standards. The goal will be to produce a portfolio of material for their own class(es) that increase student mastery of knowledge, skills, and abilities across a range of learning.

  LEARNING OBJECTIVES/TARGETS:

  By the end of this course participants should be able to:
  - Assemble lessons that appropriately align state science standards with their own content/subject areas
  - Define different methods/models of teaching and select best-practice methods for specific levels of learning according to Bloom's Taxonomy
  - Create a portfolio of lessons that is applicable to themselves in their own classrooms

Course Requirements/Assignments

Reflections on New Learning

Participants will be required to work through a power point that is means to engage them in the active construction of their own knowledge related to various approaches to teaching science. Each power point will lead them to construct a lesson for incorporation into a portfolio of lessons that they can and will use in their own teaching. Participants will be permitted to either create lessons from scratch, or redo previous lessons. *If they are redoing previous lessons, they will be required to submit the old version with the new version for comparison, and reflect on the improvements made based on the new/refined approach*. In order to be deemed "satisfactory", work must "meet expectations" according to the rubric (attached here and also displayed below). Each portfolio should contain 10 lessons with a new model or method of teaching science incorporated into it.

Application of New Learning:

I will be looking for evidence that participants can:

1) Identify appropriate state science standards for the subject, level and discipline they teach.
2) Define and describe various methods of teaching. (For example, direct instruction, guided

inquiry, problem based learning, Socratic method, constructivism etc.).
3) Classify learning according to Bloom's Taxonomy.
4) Align teaching method with learning outcomes by developing a planned series of activities for their students that participants develop into their own portfolio using the approach of a selected module.

Lesson Topics and Assignments

Total Instructional Hours: 45

Online Lesson/Session #1 **Classifying Learning (REQUIRED)**	Estimate of Instructional HOURS
Module #1 (REQUIRED) will focus on Classifying Learning According to Blooms Taxonomy. I am a firm believer that the best learning in students happens when an educator "begins with the end in mind". To me this means that ***before*** we start **teaching**, we should know A) what knowledge, skills, and abilities students will be expected to gain (i.e. ***learn***), B) have clearly developed plans for how students will demonstrate this (i.e. assessment), and C) clearly defined levels or ranges of success (i.e. grading, rubrics, or other evaluation criteria). This allows an educator to align their teaching with expected learning, and to communicate those expectations clearly. I will use Bloom's Taxonomy as the basis or foundation for this, and aspects of it will need to be incorporated into all subsequent modules, and corresponding portfolio products. **Participants will produce** their own summary/reference to assist them with developing appropriate learning goals and objectives, and for classifying future assessments according to appropriate alignment with Bloom's Taxonomy.	4.5

Online Lesson/Session #2: **Learning styles (or lack thereof…) (REQUIRED)**	Estimate of Instructional HOURS
Module #2 (REQUIRED) will focus on Learning Styles. There is a wealth of information available about learning styles, but there are even more misconceptions and misinformation about learning styles. This module will seek to define and describe various learning styles a science educator is likely to encounter, and then apply that information in a real-world manner that allows the educator to provide instructional material and learning opportunities that A) maximize learning through differentiated instruction and scaffolding in an evidence-based manner and B) aligns instruction with various levels of targeted learning as classified by Bloom's Taxonomy (see module #1). **Participants will produce** their own summary/reference to assist them with identifying learning styles and misconceptions, ways to confront misconceptions, and approaches to align instruction with different levels of Bloom's Taxonomy.	4.5

Online Lesson/Session #3: **Constructivism and Social Constructivism (REQUIRED)**	Estimate of Instructional HOURS
Module #3 (REQUIRED) will focus on Constructivism and Social Constructivism. Background and historical information, along with examples will lead into different applications and uses about how to incorporate and integrate these philosophical approaches appropriately to foster the type of learning that these methods target. **Participants will produce** either A) a previous lesson they have done or used and then chosen to redo, or B) a completely new lesson with a focus on integrating constructivism. Either way, a reflection about the effectiveness of this new approach and anticipated student outcomes is to accompany the lesson, which will be evaluated according to the rubrics.	4.5

Online Lesson/Session #4 **Inductive Scientific Reasoning (REQUIRED)**	Estimate of Instructional HOURS
Module #4 (REQUIRED) will focus on Inductive Scientific Reasoning. Background and historical information, along with examples will lead into different perspectives and uses about how to identify, foster, and reinforce indictive strategies that appropriately foster the type of learning these approaches effectively target. **Participants will produce** either A) a previous lesson they have done or used and then chosen to redo, or B) a completely new lesson with a focus on fostering indictive scientific reasoning in their students. Either way, a reflection about the effectiveness of this new approach and anticipated student outcomes is to accompany the lesson, which will be evaluated according to the rubrics.	4.5

Online Lesson/Session #5 **Behaviorism (optional)**	Estimate of Instructional HOURS
Module 5 (optional) will give background and historical information about Behaviorism, along with examples, will lead into different perspectives and uses for how to appropriately incorporate and integrate strategies that foster the type of behavior(s) that are conducive to learning and success, especially in a science class (such as inquiry, perseverance, and goal-setting). **Participants will produce** either A) a previous lesson they have done or used and then chosen to redo, or B) a completely new lesson with a focus on integrating behaviorism. Either way, a reflection about the effectiveness of this	4.5

new approach and anticipated student outcomes is to accompany the lesson, which will be evaluated according to the rubrics.	

Online Lesson/Session #6 **Direct Instruction (optional)**	Estimate of Instructional HOURS
Module #6 (optional) will focus on Direct Instruction. Background and historical information, along with examples will lead into different perspectives and aplications related to incorporating and integrating direct instructional strategies that appropriately foster the type of learning (Remembering and Understanding especially according to Bloom's) these methods target. **Participants will produce** either A) a previous lesson they have done or used and then chosen to redo, or B) a completely new lesson with a focus on integrating direct instruction appropriately. Either way, a reflection about the effectiveness of this new approach and anticipated student outcomes is to accompany the lesson, which will be evaluated according to the rubrics.	4.5

Online Lesson/Session #7 **Socratic Method (optional)**	Estimate of Instructional HOURS
Module #7 (optional) will focus on the Socratic Method. Background and historical information, along with examples will lead into an exploration of the approach that incorporates and integrates Socratic-based instructional strategies that appropriately foster the type of thinking and learning that this approach is meant to foster. **Participants will produce** either A) a previous lesson they have done or used and then chosen to redo, or B) a completely new lesson with a focus on integrating Socratic approaches. Either way, a reflection about the effectiveness of this new approach and anticipated student outcomes is to accompany the lesson, which will be evaluated according to the rubrics.	4.5

Online Lesson/Session #8 AND 9 **Problem-Based and Project-Based Learning**	Estimate of Instructional HOURS
Module #8 AND 9 (BOTH optional) will focus on Project-Based and Problem-Based Learning. I am doing this a little differently, and you may choose to do one, both or neither of these modules. But because they are so similar (and often confused), I am presenting them together. Background and historical information for BOTH, as well as a compare-and-contrast of each, along with examples will lead into different perspectives and applications about when, why, and how to incorporate and integrate these strategies and approaches to learning that appropriately foster the type of outcomes these approaches target. **Participants will produce** either A) a previous lesson they have done or used and then chosen to redo, or B) a completely new lesson with a focus on integrating problem-based learning. Either way, a reflection about the effectiveness of this new approach and anticipated student outcomes is to accompany the lesson, which will be evaluated according to the rubrics. ***NOTE: There is a lot of similarity with this and "Project-Based Learning (module 9 below). I encourage participants to ONLY select one of them unless they make a compelling argument for doing both).***	4.5 - 9

Online Lesson/Session #10 **Co-Teaching (optional)**	Estimate of Instructional HOURS
Module #10 (optional) will focus on Co-Teaching. Background, historical, and contextual information, along with examples will lead into different perspectives and applications about when, why, and how to consider co-teaching. **Participants will produce** either A) a previous lesson they have done or used and then chosen to redo, or B) a completely new lesson with a focus on why co-teaching is appropriate. Either way, a reflection about the effectiveness of this new approach and anticipated student outcomes is to accompany the lesson, which will be evaluated according to the rubrics. *NOTE: If a participant selects this module, they must actually identify a real person (not some hypothetical individual) who would in fact actually co-teach with them.*	4.5

Online Lesson/Session #11 **Activist Teaching (optional)**	Estimate of Instructional HOURS
Module #11 (optional) will focus on Activist Teaching. Background and historical information, along with examples will lead into different perspectives and applications about who might consider activist teaching, and when, why, and how they might incorporate and integrate strategies that appropriately foster the type of learning these approaches target. **Participants will produce** either A) a previous lesson they have done or used and then chosen to redo, or B) a completely new lesson with a focus on integrating problem-based learning. Either way, a reflection about the effectiveness of this new approach and anticipated student outcomes is to accompany the lesson, which will be evaluated according to the rubrics.	4.5

Online Lesson/Session #12 **Feminist Pedagogies (optional)**	Estimate of Instructional HOURS
Module #12 (optional) will focus on Feminist Pedagogies. Background and historical information, along with examples will lead into different perspectives and applications about when and why to consider feminist pedagogies, and how they might incorporate and integrate strategies that appropriately foster the type of learning these pedagogies target. **Participants will produce** either A) a previous lesson they have done or used and then chosen to redo, or B) a completely new lesson with a focus on integrating problem-based learning. Either way, a reflection about the effectiveness of this new approach and anticipated student outcomes is to accompany the lesson, which will be evaluated according to the rubrics. NOTE: The irony of a male instructor (me) teaching about feminist pedagogies is not lost on me. Please forgive that if you choose this module, and understand that in no way am I trying to do anything other than make you aware of these approaches and their value.	4.5

Online Lesson/Session #13 **Short Description of TOPICS Covered & Student Tasks/Assignments**	Estimate of Instructional HOURS
Module #13 (strongly encouraged but NOT required) will have 2 different options. Participants may either A) Identify a pedagogical approach ***NOT*** covered above, or B) redo a pedagogical approach that I selected which they feel was not done justice by me (please note that I encourage *constructive* criticism – in other words, you are free to criticize but be professional and positive). **Participants will produce** A) A proposed topic ***at least 3 weeks prior to taking this module on*** then either B) a new, unlisted pedagogy and ALL lesson material for it that they have created (with the understanding that I may adopt it in the future) or C) a completely new and redone version of what I did, which they feel better aligns with the topic they selected. Either way, ALL material for fully functioning module is to be produced that future participants could benefit from. A reflection about the effectiveness of this new approach and anticipated participant outcomes (think of your peers) is to accompany the product, which will be evaluated according to the rubrics and a dialogue between the participant and myself.	4.5

Referenced Textbook(s)

There are no textbooks to buy for the PDE. All papers, readings, websites, and other resources are linked within the power point for each module. If a link is broken, papers are also posted in the folder for each module as a backup.

Grading and Evaluation:

Scores for individual modules will reflect the combination of evaluations in all categories (1 for "fails to meet" through 5 for "exceeds" on all three rubrics. So scores can range from 3-15 for completed assignments. I will consider "passing" to be any section of a portfolio that contains 2 "meets" (scores of 3) and 1 "marginally meets" (score of 2). Because this PDE is intended for practicing teachers I do not expect this to be an issue. If it is, you will be given two chances to refine your portfolio product and to talk with me about how to better prepare material. If after the second opportunity refinements are not made we will move forward with finding a mediator who can help us both clearer communicate my expectations, and improve your product.

Scholastic Dishonesty

Students enrolled in this course are expected to be aware of the seriousness of scholastic dishonesty. Unacceptable behavior such as submitting someone else's work as your own, cheating on exams, or plagiarizing can result in failure of the course or other sanctions. For a more detailed description of these policies, please refer to the UND Code of Student Life; Appendix IIIa-3, at http://und.edu/student-affairs/code-of-student-life/