Pedagogical Models and Teaching Standards: A Framework for Higher Education Curriculum in Aviation and Engineering

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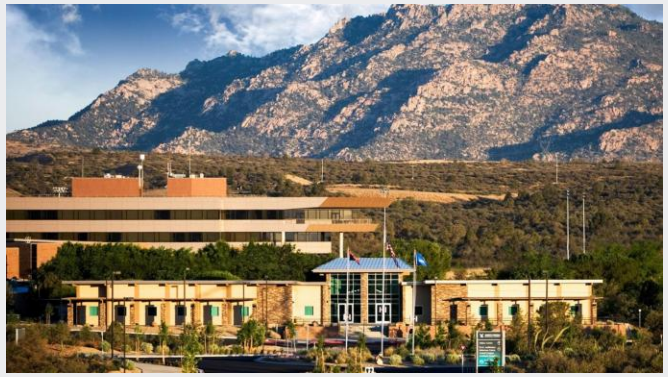
Residential Campuses

Daytona Beach, Florida

Prescott, Arizona



Worldwide (Online Campus)

- Over 100 campuses across the U.S., Europe, Asia, and South America with multiple modalities, including online, blended, and in person
- Three colleges: College of Aviation (COA), the College of Arts & Sciences (COAS), and the College of Business (COB)

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Agenda

- Grant Objectives
- Overview of Six Key Pedagogical Models
- Backward Design Model for Curriculum Development
- Educational Technology Tools
- Integration of Industry Standards Into Curriculum
- Sustainability and Contextual Adaptation of Pedagogical Models
- NIST Acknowledgement
- Q& A

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Grant Objectives

1. Create two customizable modules on engineering and aviation standards into higher education curricula to enhance learning outcomes.
2. Evaluate student outcomes with input from university boards and subject matter experts across campuses.
3. Develop a model curriculum for wider use in colleges to integrate standards and support certifications

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Overview of Six Key Pedagogical Models

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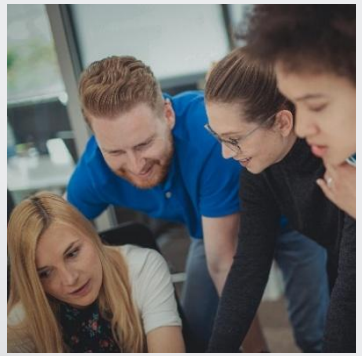
Social Constructivism: Fostering Knowledge Through Social Interaction

Learning as Social Process

Social constructivism views learning as occurring through social interaction and collaboration among students.

Knowledge Construction Through Dialogue

Students build knowledge actively by engaging in meaningful dialogue and exchanging perspectives.



Enhancing Deeper Understanding

Shared experiences and collaboration promote deeper comprehension and critical thinking skills.

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Resource-Based and Collaborative Learning: Leveraging Materials and Teamwork

Resource-Based Learning

Encourages using diverse materials to enhance understanding and stimulate critical thinking.

Collaborative Learning

Fosters teamwork and communication to solve complex problems actively and effectively.

Problem-Based, Narrative-Based, and Students as Partners: Engaging Students in Real-World Contexts

Problem-Based Learning

Students engage with real-world problems to develop critical thinking and practical solutions.

Narrative-Based Learning

Storytelling connects curriculum content to authentic contexts, increasing student engagement.

Students as Partners

Students co-design curriculum, promoting ownership and meaningful learning experiences.

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Backward Design Model for Curriculum Development

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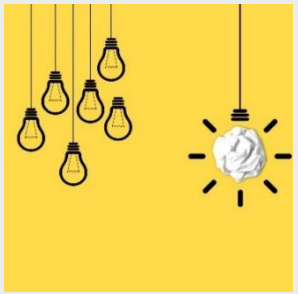
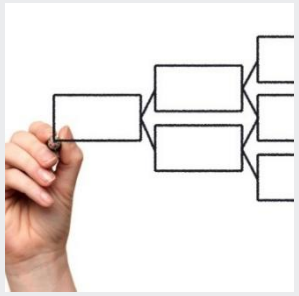
Core Principles of the Backward Design Model



Outcome-Based Planning

Focuses on defining clear learning outcomes before planning instruction and assessments.



Alignment of Objectives

Ensures learning objectives are directly connected to assessments and teaching strategies.

Coherent Learning Experience

Creates a purposeful and consistent learning journey for students by integrating all components.

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Applying Backward Design to Module Creation and Instructional Planning

Defining Clear Goals

Instructors start by setting clear, measurable learning objectives aligned with student needs and outcomes.

Selecting Content and Activities

Appropriate content and engaging activities are chosen to support the achievement of learning goals effectively.

Designing Mastery Assessments

Assessments are designed to accurately measure student mastery and ensure curriculum effectiveness.

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Tools

Yellowdig

H5P

CANVAS BY INSTRUCTURE

Integration of Industry Standards Into Curriculum

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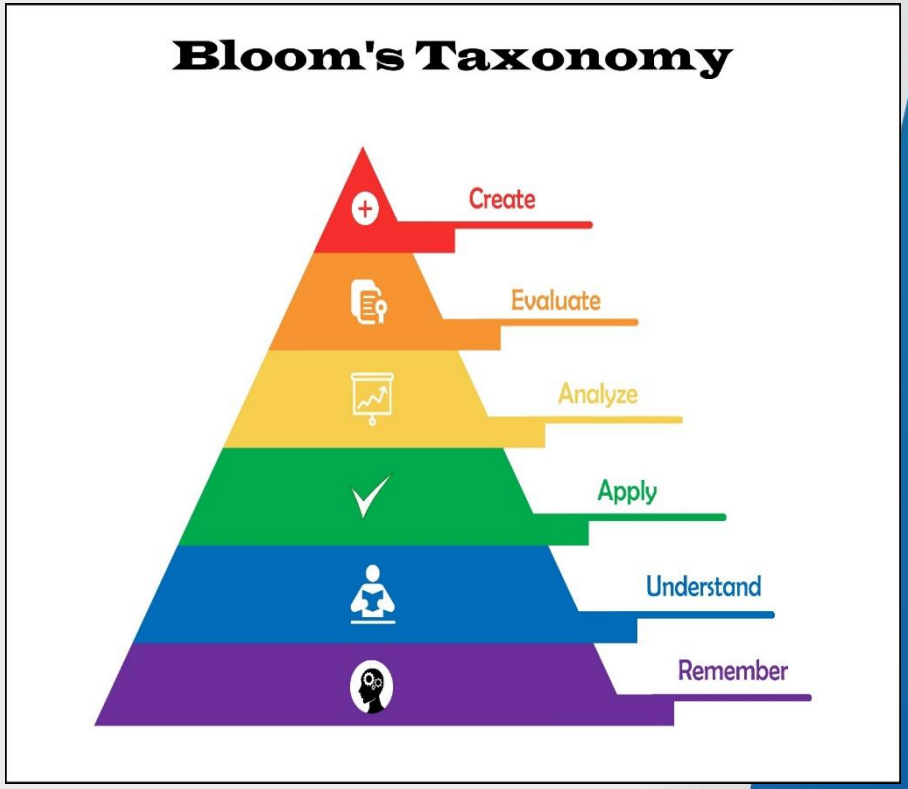
Bloom’s Taxonomy

- The content structure for this course was developed using Bloom's Taxonomy to promote progressive learning.
- Module 1 focuses on foundational standards, utilizing lower-level verbs (like recall* and recognize) for initial introduction.
- Module 2 then advances to application and critical thinking by employing higher-order verbs (such as analyze and evaluate) to build upon the established knowledge.



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ASCI 693: Current Research Problems
Aviation/Aerospace Standards

ASCI 693:
Current Research Problems in Aviation/Aerospace

Focus on

ISI 31000
(For Risk Management)

SAE AS 9100
(Quality Systems for Quality Assurance

Important Update: SAE 9100 will be revised in 2026 and will become IA 9100

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ASCI 693 Current Research Problems In Aviation/Aerospace

Module 1: Overview and Objectives

ASCI 693

Course Introduction
Welcome to ASCI 693

1.1 Yellowdig Conversation
Introductions

Module 1 Yellowdig Conversation
Instructor's Corner

1.2 Reading
Ethical Research and the Role of Standards

1.3 Micro-Lessons
Accessing and Discovering Standards

1.4 Assignment
Apply the Problem-Solving Process

1.5 Assignment
Research Ethics - Institutional Review Board Training

Module 1 Survey

Module 1 Wrap-Up

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Engineering Classes

Environmental Engineering Course Structure

CIV 222:
Introduction to Environmental Engineering

FOCUS ON

ISO 9001
(For Quality Management)

ISO 14000
(For Environmental Management)

CIV 417:
Air Pollution

ASHRAE Standard 62.1
(Ventilation and Acceptable Indoor Air Quality)

ASHRAE Standard 62.2
(Ventilation and Acceptable Indoor Air Quality in Residential Buildings)

National Ambient Air Quality Standards (NAAQS)

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CIV 222 Introduction to Environmental Engineering

Module 2: ISO 14001

CIV 222

Module 2 Overview and Objectives

Module 2 Resources
ISO 14001 & ISO 9001 - Presentations and Accessing Standards

Presentation Review and Knowledge Check
ISO 14001 & ISO 9001 and Accessing Standards Check (Asynchronous)

Additional Resource Readings

Class Discussion
Plan-Do-Act Sustainably

Article Review
Critical Analysis of ISO 14001 and ISO 9001 Standards in Engineering Applications

Module 2 Survey

Module 2 Wrap-Up
Summary and next steps

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CIV 417 Air Pollution

Module 1: Fundamentals of Indoor Air Quality

and ASHRAE Standards

CIV 417

Course Introduction
Welcome to CIV 417

Module Overview
Objectives and Learning Outcomes

Readings & Resources
Essential materials and references

Knowledge Checks
Why Study Indoor Air Quality?
Indoor Air Quality Standards

Article Review (PLG1)
Critical Analysis of Standards in Engineering Applications
100 points

Discussion Forum
Debating ASHRAE Standards in Ventilation Design
100 points

Quiz: Matching Terms
Test your understanding of key concepts
100 points

Module Wrap-Up
Summary and next steps

Sustainability and Contextual Adaptation of Pedagogical Models

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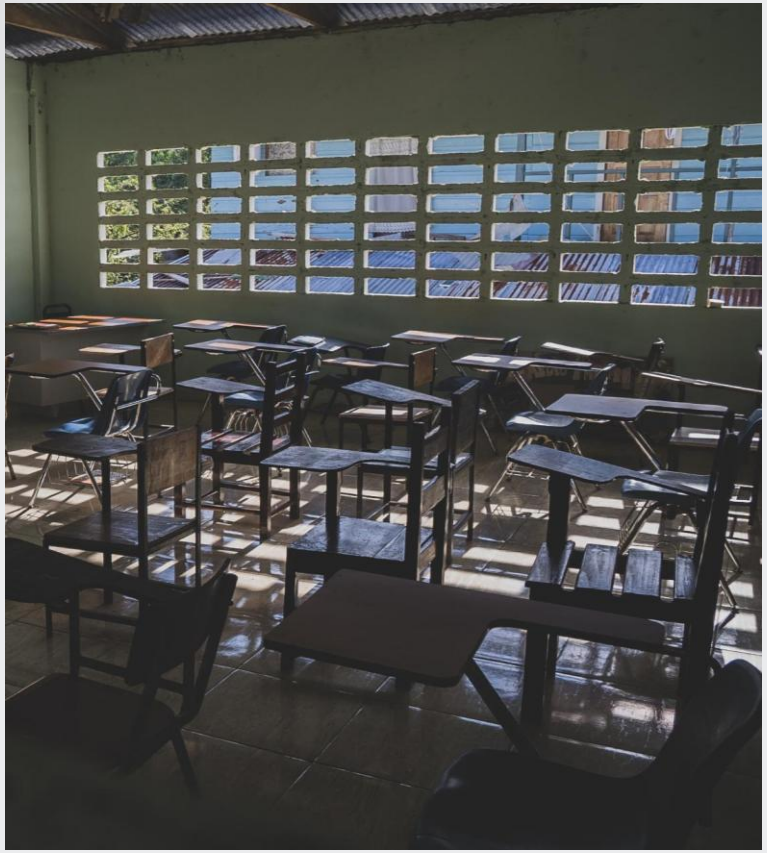
Evaluating Sustainability in Diverse Educational Settings



Long-term Effectiveness

Evaluating how educational models sustain learning outcomes over extended periods in varied settings.

Scalability of Models

Assessing the potential to expand pedagogical approaches across different institutions and regions.

Adaptability

Adapting teaching practices to fit diverse learners and institutional environments for greater impact.

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Continuous Improvement Through Feedback and Reflection

Ongoing Evaluation

Regular assessment helps educators identify strengths and areas for improvement in teaching strategies.

Student Feedback

Collecting student input provides valuable insights to tailor instruction to learners' needs.

Reflective Practices

Educators reflect on their teaching to enhance curriculum and improve learning outcomes.

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- The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the National Institute of Standards and Technology or the U.S. Department of Commerce.

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THANK YOU FOR ATTENDING.

QUESTIONS?

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