Backward Design to Promote Tangible Outcomes in Graduate Student Professional Development

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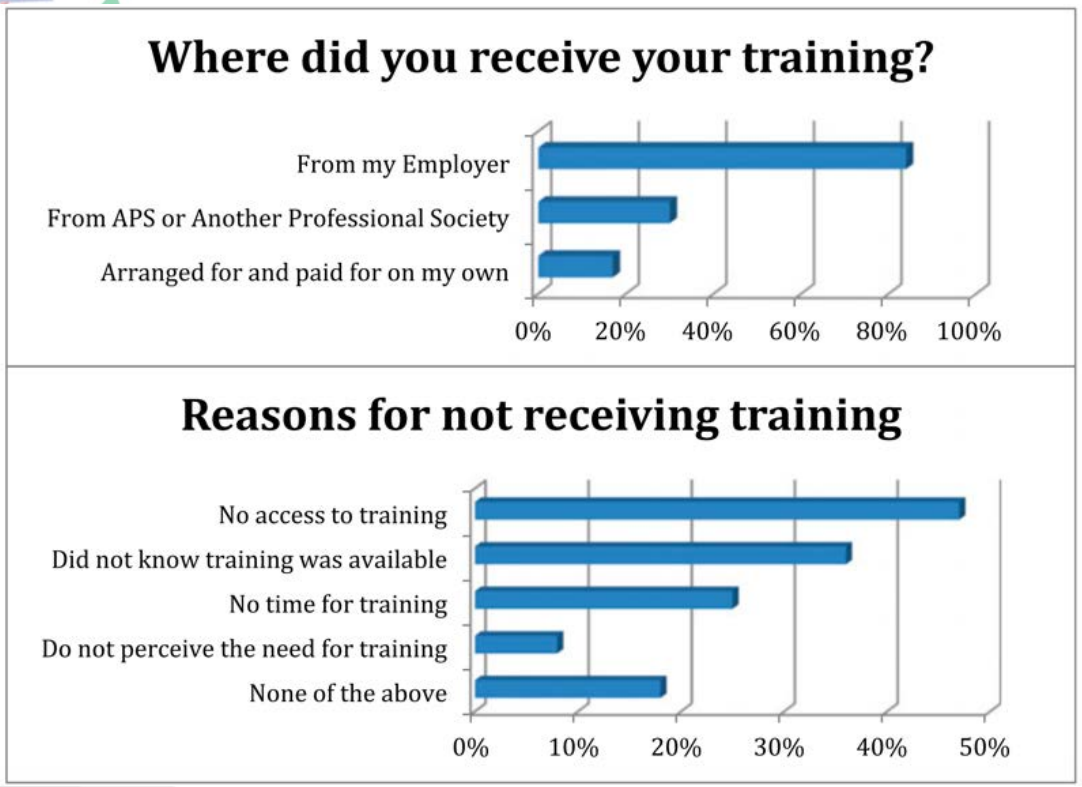
Context for the Course

Why is professional development important for graduate students?



Beckerman & Schneider 2016

Students are entering careers without necessary training

When training is obtained:

- Only 4% from formal classes
- 72% of training is self-directed

Study finds that participants consider **intentional learning** opportunities desirable

Context for the Course

Why is professional development important for graduate students?

Richter et al. 2018

Top Skills Employers Want

- Teamwork
- Adaptability
- Communication
- Time Management

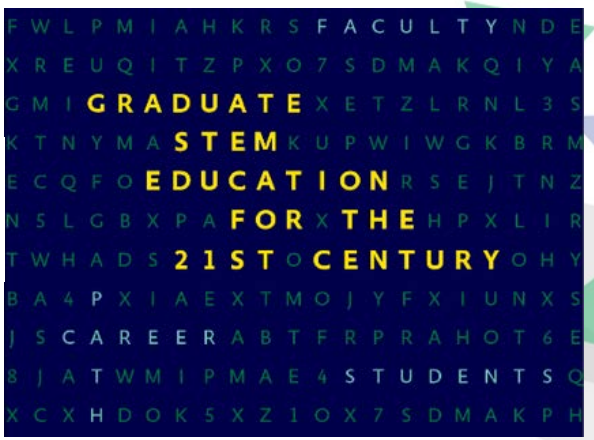
AAAS Consensus Report 2018

Core Elements of Graduate Training

- Work collaboratively
- Develop management skills
- Communicate with many audiences (STEM fields, policymakers, & public)

CASNR Strategic Framework 2018

Goal: determine the vision for graduate education



Success in the Sciences

Summer 2018

Students in Interdisciplinary Life Sciences

- Agronomy & Horticulture
- School of Biological Sciences
- Biochemistry
- Chemical Engineering
- Plant Pathology

Success in the Sciences

Summer 2018

8 week Format

Meeting for 2hrs, Twice per week

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Design Team

- Complex Biosystems Grad Students
- Faculty Sponsor in Plant Pathology
- Instructional Design Coordinator

Large Variability in Prior Experience & Grad Training

- Some with 3+ years
- Others with <1 year

Design Goals

Empower students to make individualized goals to achieve "success" in graduate school and beyond

What does the university offer to help me in my program?

What makes a 'good' quality research paper?

What about careers outside academia?

How do I decide which journal to submit to?

How do I prepare for scientific presentations?

Do I need to be on twitter to get a job?

Backward Design

How did we create this course?

Phase I

Deciding on Course Topics

Sticky Wall and Dot technique used to identify and prioritize topics for the course

Phase II

Developing Learning Objectives

Language from Bloom's Learning Domains used to describe tangible outcomes

Phase III

Designing Activities & Assessments

Emphasizing the tangible outcomes in our objectives we used Active Learning Strategies

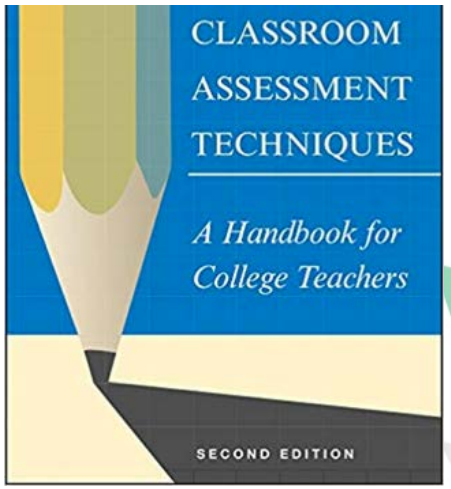
Phase I – Sticky Wall & Dot

What is our intention for the course?

Teaching Goals Inventory : Cluster Scores

	A Cluster Number and Name	B Goals Included	C Sum of Ratings Given to Goals in That Cluster	D Divide C by This Number	E Your Cluster Scores
I.	Higher-Order Thinking Skills	1-8	_____	8	_____
II.	Basic Academic Success Skills	9-17	_____	9	_____
III.	Discipline-Specific Knowledge and Skills	18-25	_____	8	_____
IV.	Liberal Arts and Academic Values	26-35	_____	10	_____
V.	Work and Career Preparation	36-43	_____	8	_____
VI.	Personal Development	44-52	_____	9	_____

Angelo & Cross 1993



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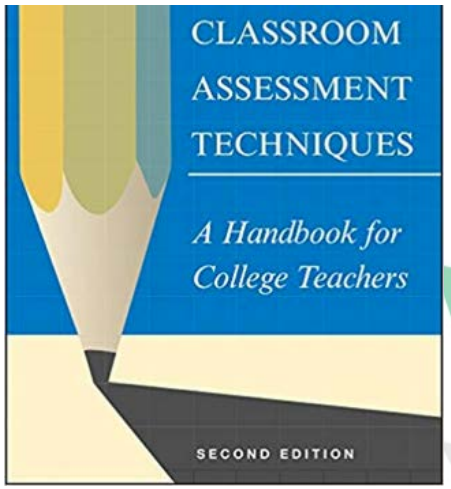
	A Cluster Number and Name	B Goals Included	C Sum of Ratings Given to Goals in That Cluster	D Divide C by This Number	E Your Cluster Scores	
I.	Higher-Order Thinking Skills	1-8	27.5	8	3.43	3
II.	Basic Academic Success Skills	9-17	19.5	9	2.16	
III.	Discipline-Specific Knowledge and Skills	18-25	28.5	8	3.56	2
IV.	Liberal Arts and Academic Values	26-35	20	10	2.00	
V.	Work and Career Preparation	36-43	33	8	4.13	1
VI.	Personal Development	44-52	24	9	2.66	

Angelo & Cross 1993



Phase I – Sticky Wall & Dot

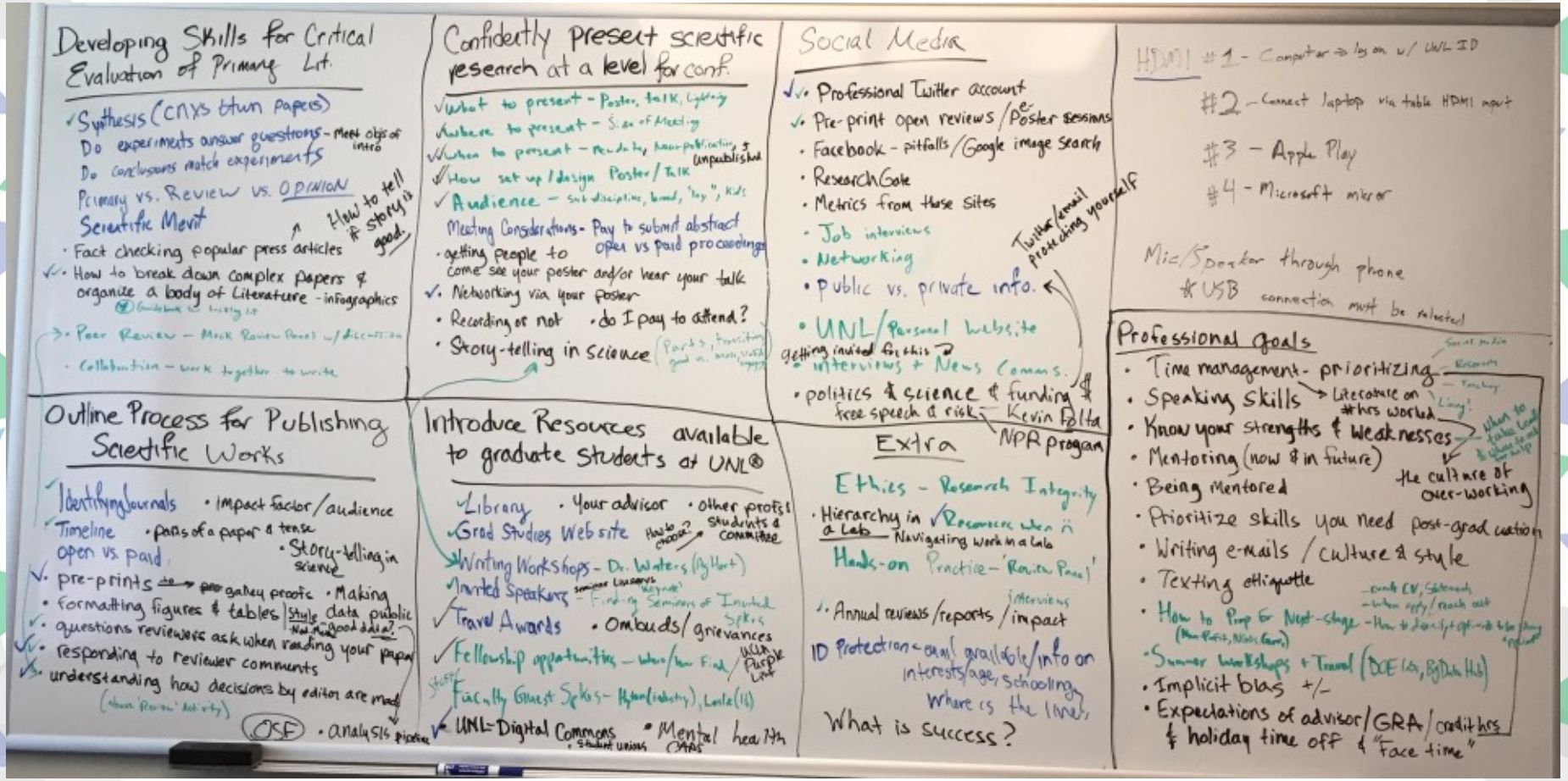
Method for Identifying and Prioritizing Tasks & Topics

Sticky Wall & Dot is a collaborative method with immediate feedback

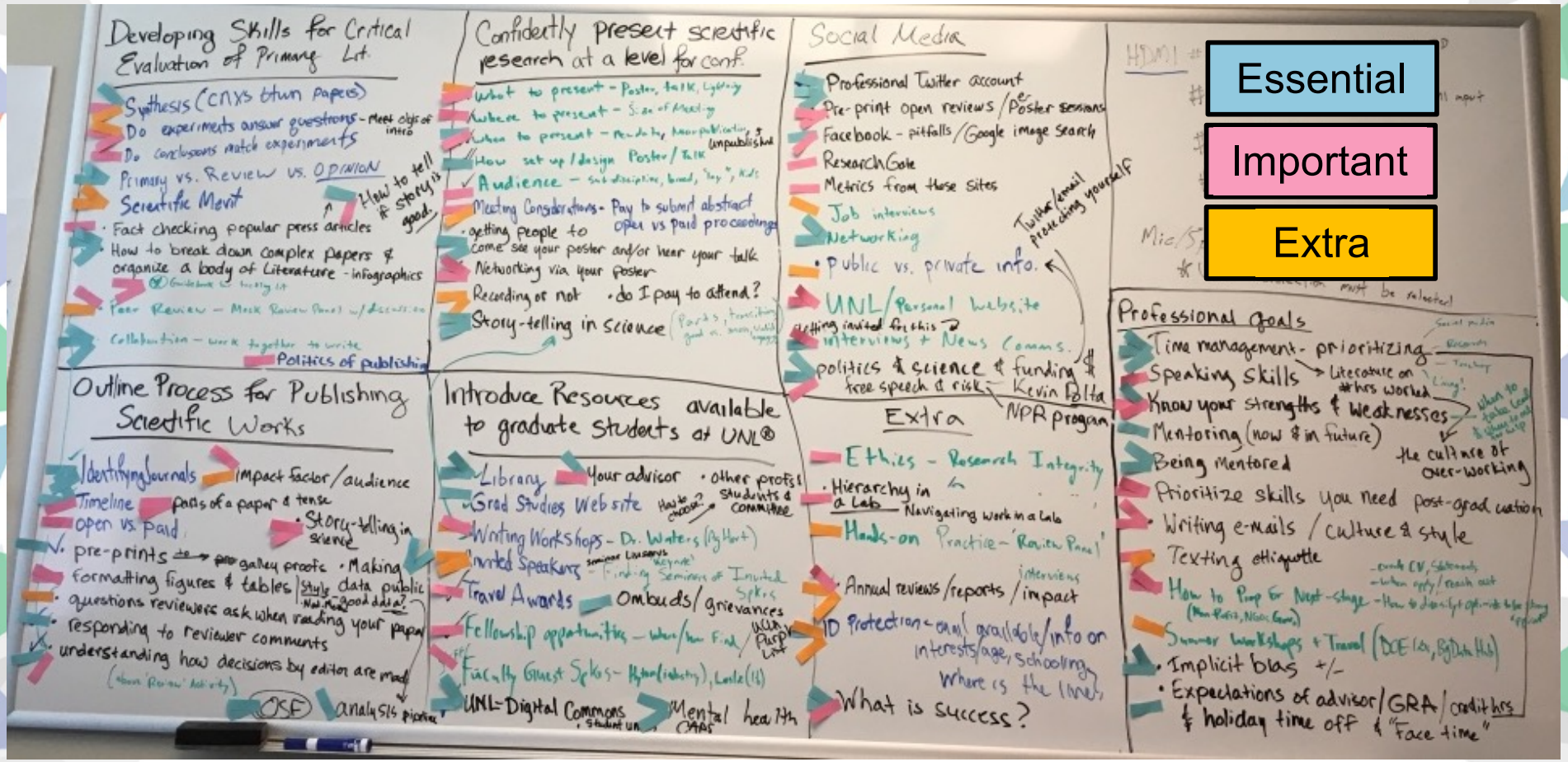
Steps:

- Take general concepts and brainstorm lists of topics that fit the goals of the clusters (Identify)
- Annotate list with priorities for the course (Prioritize)

Phase I – Sticky Wall & Dot



Phase I – Sticky Wall & Dot



Phase II – Learning Objectives

What do we want students to get out of the course?

Goal: encapsulate tangible outcomes in the language of learning objectives

Bloom's Taxonomy of Learning Domains

Knowledge

Comprehension

Application

Analysis

Synthesis

Evaluation

Learning Objectives facilitate the **intentionality** that is a key component of backwards design

Phase II – Learning Objectives

Creating Learning Objectives: from topics to outcomes

Topic of Interest: Develop skills for critical evaluation of primary literature

Brainstorm from Phase I:

- How to break down complex papers and organize literature (infographics)
- How to tell if a story is “good”
- Synthesis – connections between papers
- Politics of publishing
- Do experiments answer question and do conclusions match experiments

Learning Objective: **Deconstruct** the parts of a scientific story and **assess** the quality of the story

Bloom’s Learning Domains: **Analysis** and **Evaluation**

Phase II – Learning Objectives

3 Topical Themes, each with 4 objectives

Topical Theme 1

Exploring, Developing, and Implementing Concepts in Scientific Storytelling

Topical Theme 2

Identifying and Deconstructing the Process and Pitfalls of Publishing

Topical Theme 3

Examining, Building, and Integrating "Success" in your Scientific Career

12 Learning Objectives in all

Phase III – Assessing Outcomes

How can we facilitate “tangible” outcomes?

Goal: encourage participants to develop individualized artefacts

Assessments

Examples:

- Minute papers
- Reflective writing
- Summative Project

Activities

Active Learning Techniques:

- Gallery Walk
- Think, Pair, Share
- Jigsaw
- and more!

Resources:

Classroom Assessment Techniques
Angelo & Cross 1993

Collaborative Learning Techniques
Barkley, Major, & Cross 2014

Phase III – Assessing Outcomes

Classify strengths and weaknesses and **develop** strategies suited to your personality to achieve your “success”

Bloom’s Domains: Comprehension & Synthesis

Activities

Before class: 16 Personalities test

In-class: Apply the discussion to a real-world scenario

Design an 8-week program for a summer REU student

Two groups of students:

- Organization & Structure (J)
- Easy-going & Flexible (P)

Phase III – Assessing Outcomes

Classify strengths and weaknesses and **develop** strategies suited to your personality to achieve your "success"

Bloom's Domains: Comprehension & Synthesis

Assessments

Minute paper	"Knowing a colleagues MBTI could change how you'd interact or plan about them"
Reflective Writing	"If I knew my advisor's personality traits would make our partnership easier and help me be aware what was expected of me as his student and what to expect with him as my advisor. Hopefully, it would make me a better member in his lab."
Summative Project	"I will need to work on getting used to planning out tasks and delegating as well as working with people when things aren't going the way that was expected. Things I hope will be easy for me will be listening and acting on the needs of my future students."

Phase III – Assessing Outcomes

Classify strengths and weaknesses and **develop** strategies suited to your personality to achieve your "success"

Bloom's Domains: Comprehension & Synthesis

Activities	Discussion, collaboration, & evaluation of traits in different scenarios
Assessments	Self-reflective evaluation & application to individual career paths
Tangible Outcomes	List of personality features that describe the student and an outline of potential strategies for being mentored and mentoring

Skills desired by employers: Teamwork, Adaptability, Communication

Promoting Intentional Learning

Why is professional development important for graduate students?

Beckerman & Schneider 2016

Success in the Sciences is a unique class designed to address these needs

Intentionality in design is translatable to other courses:

- Encapsulating tangible outcomes with learning objectives
- Developing in-class activities to support objectives
- Integrating assessments to build on activities and objectives

Thank you!

Contact us with any questions!
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