PBEA
PLANT BREEDING E-LEARNING IN AFRICA

Mini-Symposium: Applied Learning Activities

Your name:
Course you teach:

Prepared by:

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Reference. Mills, R. (2015). Introduction to Applied Learning activities. Retrieved from https://pbea.agron.iastate.edu/course-materials/other-materials/introduction-applied-learning-activities

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Basic Information on Plant Breeding in Africa E-Learning Modules

The goals of this project are to provide you up-to-date cutting edge content curriculum materials to you.

Reminders:

PBEA website: https://pbea.agron.iastate.edu/

PBEA Course Instructor Guide: https://pbea.agron.iastate.edu/plc/plant-breeding-e-learning-module-discussion/course-guide-pbea-molecular-plant-breeding

Professional Learning Communities Goals:

- To assist African professors with integrating the PBEA e-learning modules into their classroom curriculum
- To assist African professors with improving overall instruction

PBEA- PLC webpages to assist your instruction:

https://pbea.agron.iastate.edu/

Get signed in by following the login prompts: If you need assistance contact Walter Suza at wpsuza@iastate.edu

Mini-Symposium: Applied Learning Activities

Welcome.

You play a significant role in determining student success in plant breeding. This workshop will help you learn some practices and skills that will aid you in becoming a better instructor.

This module will assist in you in designing and implementing applied learning activities.

Ice-breaker

Describe the most effective activity you created for a class or experienced as a student?

What made the activity effective?

Designing Applied Learning Activities (ALAs)

Participants will:

- Review information on the importance of using and creating ALAs.
- Review an ALA template.
- Review background on case studies, scenarios, simulations, etc.
- Apply cognitive load theory and scaffolding to ALA design.
- Identify resources available to write ALAs.
- Practice writing an ALA purpose/objective; write an ALA procedure or task, background and assessment questions.
- Receive feedback on ALAs and peer mentor.

What is an Applied Learning Activity?

For the PBEA project, "an applied learning activity is an exercise, case study, learning task, scenario, or an experiential learning activity which are used by educators to model expertise to learners and by learners to develop competence in applying course content." (Mills, 2015).

ALAs help learners apply authentic real-world problems directly aligned with the course content objectives.

ALAs can be used to assess if students understand content concepts.

How do you prepare students for taking important plant breeding jobs?

Telling them everything you know?

Will that approach work? Why or Why not?

**A better approach would be to assist students in building competence and confidence by helping them gain experience and making mistakes when the risks are lower, not when an entire country's breeding program is at stake.*

Applied learning activities can help build competence by:

- Helping learners perform real-world plant breeder tasks.
- Encouraging learners to use the thinking strategies plant breeders use.
- Assisting students in becoming more conscious about what content and knowledge they need to do the job.

A model that explains competence is the Dreyfus novice to expert model modified by Patricia Benner (1984).

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What does this graphic say to you?

**Becoming an expert takes years of experience beyond formal training. Experts are considered so adept at making decisions in their field that they often don't have to think about why (Benner, 1984). It might be more appropriate to work towards helping students become competent or proficient plant breeders before they complete their program of study. They do this by practicing the skills and solving the problems that plant breeders face.*

Applied learning activities can help build confidence by:

Giving students safe situations to fail and try again in order to become more competent plant breeders.

Why is failure in a safe environment a good thing?

Think about a competent plant breeder that you know. What makes him or her competent?

What are the competencies of a plant breeding educator?

How are the competencies alike and different?

If you are reviewing this you are a competent plant breeding professional. This guide along with continuous professional development can help you become more competent in your role as a lecturer or professor in plant breeding.

What you need to know to create an effective ALA.

1) Good ALAs use a problem-based approach.

A problem-based approach helps students learn about concepts and processes by solving open-ended questions as a group or individually. Students apply their knowledge by examining and defining a program, exploring what they already know about the underlying problem, determining what they need to know, evaluating ways to solve the program, solving it and reporting the findings.

2) Good ALA's help students develop a Framework for solving a problem.

When you face a plant breeding problem you reach for experiences when you solved a similar problem. You unlock a **framework** (a cognitive strategy or approach) in your mind for solving the problem. An example might be: a 5 element **framework** for analyzing a breeding operation.

1. Establish an objective(s)
2. Create variability
3. Evaluate progeny
4. Select progeny
5. Increase progeny

You might use a step by step process you or a past instructor or practitioner created to help you work through an exercise or problem. Or you might think about a time when you had to do something similar (past experiences). Having students actually work on ALAs that help them apply a framework help students

learn the thought processes that competent professionals go through to apply their knowledge, evaluate situations, and create alternatives.

Think of a plant breeding dilemma or problem in your subject area. What existing frameworks do you currently use or might you use to help solve the problem?

Problem:_____

Frameworks:_____

_____

3. <u>Good ALA's are neither too difficult nor too easy</u>.

<u>Based on **Cognitive Load theory**</u> learning happens best when what you are teaching matches the abilities of student's working memory. What you want is for students to develop permanent knowledge, by creating good lessons that:

- Minimize distractions to make the learning process more manageable. Distractions can include introducing a new software in an ALA in order to answer a problem that is not germane to what you really want students to learn. Time and thought processes used to learn the software distract students from synthesizing data or creating new approaches based on the data.
- Increase in complexity at a rate manageable by the learner. If too complex students won't feel safe and frustration or confusion will increase. If not challenged enough students also become bored or frustrated.

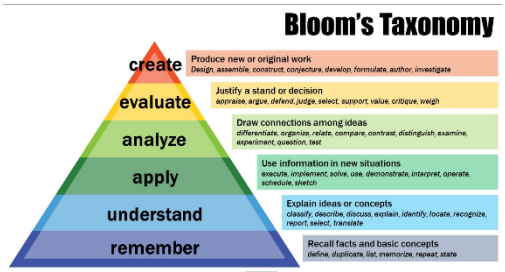
Scaffolding-is a term that refers to a variety of instructional practices that help students to incrementally make progress towards stronger understanding and greater independence in the learning process. Instructors provide temporary support so the student don't panic or become frustrated that their learning is hindered. Scaffolding helps reduce cognitive load issues.

Ways to scaffold learning:

A. Simplify versions of an assignment, reading or lesson and then gradually increase the difficulty over the length of the course.
B. Illustrate the concept, problem or process in multiple ways.
C. Model the thinking process in class for students by working through a similar problem in class.
D. Describe in detail the purpose and directions students need to follow.
E. Explain to students how the activity builds on knowledge and skills students where previously taught.

4. Good ALA design uses Bloom's Taxonomy

Review mini-symposium on lesson-planning for more detail on using Bloom's taxonomy to develop lesson objectives and assessments.



Creative Commons Bloom's Taxonomy Graphic. Credits

Think about what you want students to be able to do, understand, analyze and create by the end of the course (the competencies). What question or problem should they be able to solve? Remember to write it out as an objective (ABCD-Audience, Behavior, Condition and Degree).

When working on your ALA ask yourself:

1. What procedures, concepts, and knowledge will the learner need to know and be able to apply?
2. What analytical and evaluation skills for this task do students have?
3. Have I modeled the thinking process in class in the past that I want them to use?
4. Am I trying to have students do too much-are they having to learn a skill on top of creating a solution to a problem? Should I break up the tasks –introduce the skill in an earlier assignment then have them work on the real world problem?
5. Have I made the resources students need to solve the problem easy to find?
6. Is the ALA written in a way students know what I have asked them to do?

5. Good ALAs design uses interesting methods.

Case studies, simulations and scenarios are three teaching methods that can bring life to your ALAs. These approaches are often popular with students because in most cases there is usually not one right answer.

Many instructors like students to work in teams to think through the problem, but often ask students to turn in individual work. The rationale is that real world problems often require many minds to gather, condense and discuss solutions.

Some professors want students to attempt an ALA independently and then work as a team to discuss challenges and decide on a correct path. The rationale is that students will learn more by tapping into the collective minds of the team.

**Remember ALA's introduced early in the course may be more defined and you will scaffold ALAs throughout the course so students aren't cognitively burdened. ALA's used at the end of your course will be less defined and will require students to use the frameworks or thinking skills of a competent plant breeder.*

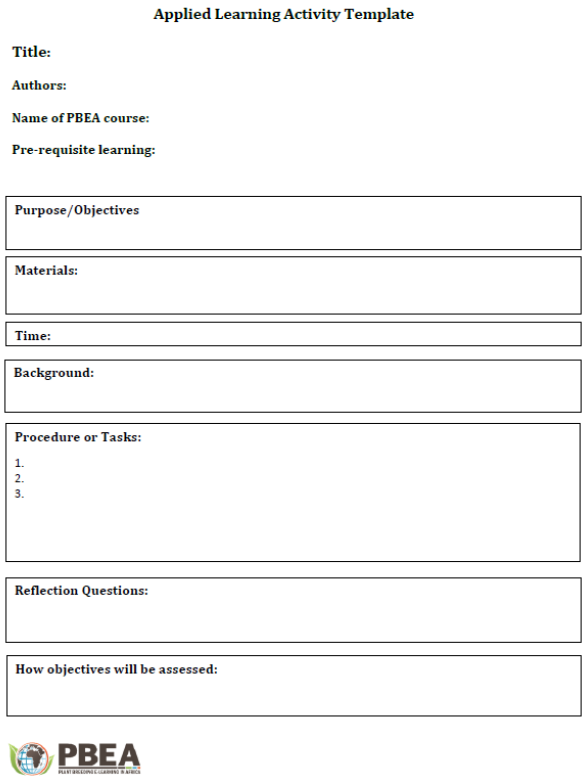
Activity

Take a few minutes to read the definition of each approach and conduct a Google Search on Plant Breeding case studies, simulations, and scenarios. List any url or existing resource that may aid you in developing your ALA in the box provided in your selected course

Approach	Definition	Resources Identified
Case Study	Is a single instance or event that illustrates a concept/problem. They are well documented and detailed. There is usually no clear-cut answer, but many possible solutions help to strengthen student's critical thinking and problem solving skills. Although, they are usually taken from the literature. You can use or modify an existing case study or create one from your own experience.	
Simulation	Imitates the operation of a real-world process or system. To simulate something it requires that a model or framework be developed. The model represents the key characteristics, behaviors and functions of the selected physical or abstract system or process. Many simulations can be developed as games. **Example**: *Fantasy Seed Company: A role Playing Game for Plant Breeders.* .	
Scenario/ Problems	A realistic activity used to illustrate or apply one main concept. Scenarios are usually short and they challenge students to make decisions and learn from consequences. These are usually written by professors. If this happens, what will occur?	

ALA Planning Part 1:

To design your ALA, a template is provided (hard copy template in the Appendix and online at the PBEA-PLC website _____. The components are much like any other lesson plan document, except you will be sharing the ALA with students to complete and possibly with other faculty to replicate in their classes. For these reasons the ALA needs to be thoroughly described.



Applied Learning Activity Template

Title:

Authors:

Name of PBEA course:

Pre-requisite learning:

Purpose/Objectives

Materials:

Time:

Background:

Procedure or Tasks:

1.
2.
3.

Reflection Questions:

How objectives will be assessed:

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Remember:

- There are educational principles and practices that will come in handy as you create an ALA.- These have been already introduced.
- Creating an ALA is like creating a lesson plan. It is an iterative process.
- Start with your purpose/objectives. Remember backwards design and Bloom's Taxonomy?
- Fill in the components and modify as you develop.

There are good ALAs to review on the PBEA website at: https://pbea.agron.iastate.edu/course-materials

Not all follow the suggested template format, but they could be modified to do so.

Think about an ALA that you want to create or modify from an existing one.

As we go through each item on the template write down your ideas to include. You won't complete the ALA during this tutorial but you will have begun the process of developing one. Two blank templates are provided in the appendices. Pull one out and write down your ideas as we go through the template.

Let's Create an ALA!

Title: is self-explanatory.

Names of authors: Are you modifying an existing ALA? If so, list previous authors first and your name at the end. Include the name of your institution for ease in contacting you.

Name of the PBEA Course and Module: An interesting name can motivate some students.

Pre-requisite learning: List concepts/skills in the module students need to understand before attempting to complete the ALA.

Purpose/Objectives: Refer to the ABCD of Lesson Planning and Bloom's Taxonomy (View the Bloom's Taxonomy Action Verbs in the booklet appendices).

Materials: List out any data sets, software, programs to download, references, slides etc. Listing upfront helps reduce cognitive overload and confusion.

Time: Estimate of the amount of time for students to complete. This allows the student to plan the time needed to complete the activity.

Background/Set the Stage: This is where you frame your exercise and grab the attention of your students to want to learn more. Many engaging ALAs start with a scenario that sets up the activity whether it be a case study, or simulation, or problem you want students to solve.

Effective ALA background

- Gets the student's attention.
- Provides real-world connection.
- Introduces a method that brings life to your applied learning activities and considers the cognitive load implications of your students

Procedure/Tasks: This is where you ask students to accomplish a number of tasks or questions that lead them to successful completion. Remember there may be multiple ways approaches to solving the problem. Most professors number each task. Some professors may ask students to think through the problem independently before working out answers with a team. A good approach is for teams to work on the same ALA, have them discuss and work out answers and then report out to the entire class.

Reflection Questions: Refer to Bloom's Taxonomy verbs for how to word effective questions to assess understanding of the ALA objectives. You can use these questions to facilitate a discussion with students

How Objectives will be assessed:

Being specific about how your students will be assessed can motivate students into doing good work. Review the Assessment Guide for ways to provide meaningful assessment. How it will be graded, rubrics are often a good way to assess ALAs, especially when there is not one right answer.

Resources:

Benner, P. (1984). *From Novice to Expert.* Menlo Park, CA: Addison-Wesley.

Mills, Rick. (2015). Introduction to applied learning activities in plant breeding. Retrieved from https://pbea.agron.iastate.edu/course-materials/other-materials/introduction-applied-learning-activities

REVISED Bloom's Taxonomy Action Verbs

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	• Choose • Define • Find • How • Label • List • Match • Name • Omit • Recall • Relate • Select • Show • Spell • Tell • What • When • Where • Which • Who • Why	• Classify • Compare • Contrast • Demonstrate • Explain • Extend • Illustrate • Infer • Interpret • Outline • Relate • Rephrase • Show • Summarize • Translate	• Apply • Build • Choose • Construct • Develop • Experiment with • Identify • Interview • Make use of • Model • Organize • Plan • Select • Solve • Utilize	• Analyze • Assume • Categorize • Classify • Compare • Conclusion • Contrast • Discover • Dissect • Distinguish • Divide • Examine • Function • Inference • Inspect • List • Motive • Relationships • Simplify • Survey • Take part in • Test for • Theme	• Agree • Appraise • Assess • Award • Choose • Compare • Conclude • Criteria • Criticize • Decide • Deduct • Defend • Determine • Disprove • Estimate • Evaluate • Explain • Importance • Influence • Interpret • Judge • Justify • Mark • Measure • Opinion • Perceive • Prioritize • Prove • Rate • Recommend • Rule on • Select • Support • Value	• Adapt • Build • Change • Choose • Combine • Compile • Compose • Construct • Create • Delete • Design • Develop • Discuss • Elaborate • Estimate • Formulate • Happen • Imagine • Improve • Invent • Make up • Maximize • Minimize • Modify • Original • Originate • Plan • Predict • Propose • Solution • Solve • Suppose • Test • Theory

Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing, Abridged Edition. Boston, MA: Allyn and Bacon.

Applied Learning Activity Template

Title:

Authors:

Name of PBEA course the ALA corresponds with:

Pre-requisite learning: (What content should understand before attempting this ALA).

Purpose/Objectives (list out objectives aligning with course and lesson objectives and using Bloom's Taxonomy):

Materials: (example: data set, software needed, references, slides needed to complete the ALA).
Reason: to reduce cognitive overload and help students use their thinking on the learning concepts. To assist other instructors with what resources are needed upfront.

Time: (estimate the time it takes for students to complete the assignment.)- Helps students and other instructors manage their time.

Background: (Describe background information for students to be successful, use real world examples, scenarios, case studies and problems).

Procedure or Tasks (Early in the course ALA's procedures may be more prescriptive, later case studies, simulations, etc. could be introduced asking students to be more creative).

1.
2.
3.

For Instructor:

Reflection Questions: (questions instructor can ask students after they all have completed the assignment).

Assessment strategy: (Example: what are you looking for to grade this, a rubric, or questions on a quiz)

Answer key for the instructor: (Provides assistance to new instructors)