AgrGROW
Promoting Agripreneurship

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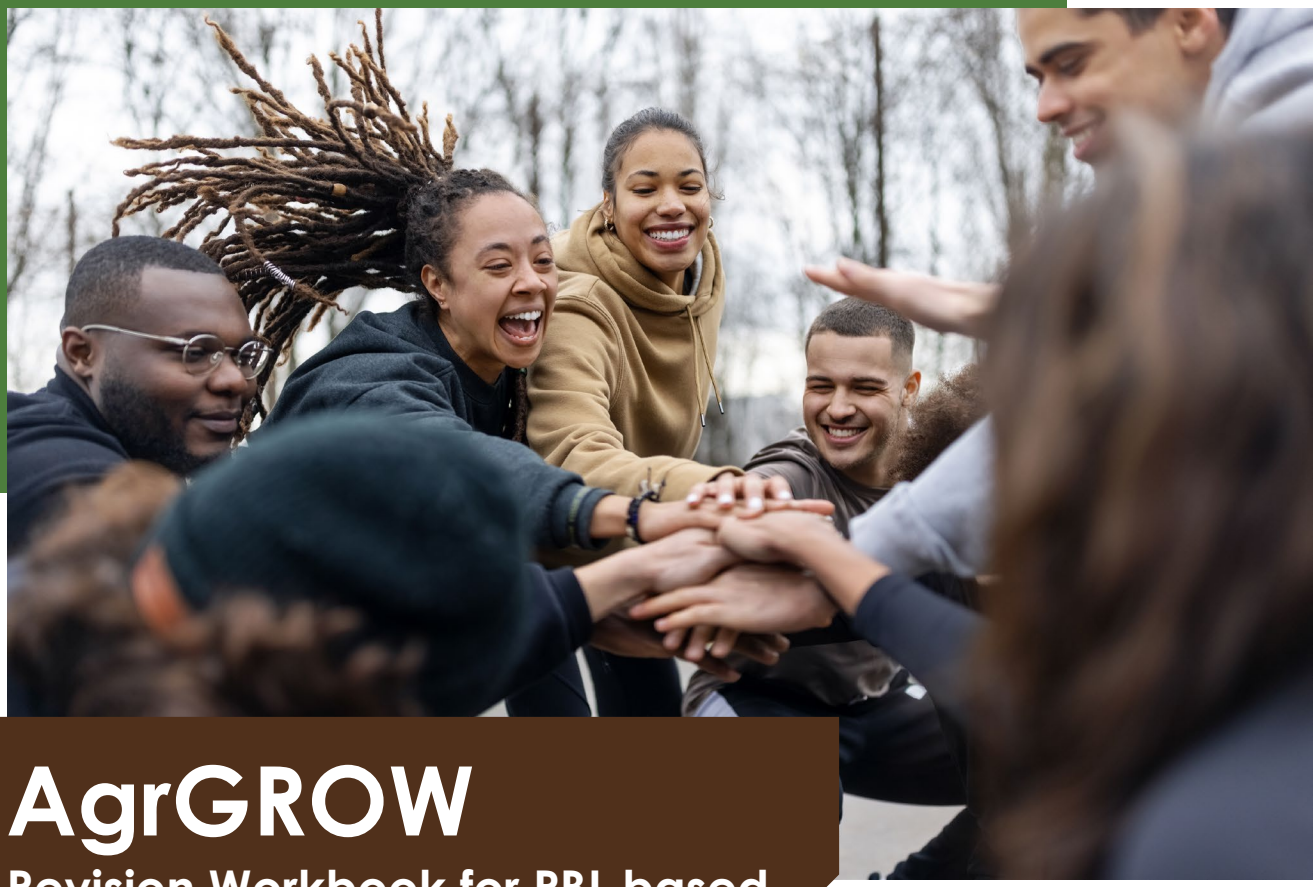

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Revision Workbook for PBL based agropreneurship Curricula

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1.INTRODUCTION TO THE CURRICULA REVISION

1.1. Competence and 21st-century skills

World Economic Forum (2023) has listed the 21st-century skills as a list of skills required from workers in the next five years. Many of the skills on this list, put more emphasis on the actual operational skills rather than theory or knowledge-based features. According to the list, the skills of creative and analytical thinking, individual curiosity, and a tendency to lifelong learning are appreciated by companies and the world of work. In addition, the tendency of the individual to be flexible and agile is on the list, indicating the demand for workers coping under stress and tolerating the changes and unpredicted issues and circumstances. Induvial competencies seem to be valued by the world of work, but also the aspect of understanding complexity and bigger contexts in terms of systems thinking is a desired feature and competence. This list of required skills pushes academia and education to reconsider how these skills could be enhanced pedagogically in universities and other educational institutions. The question is how these skills

can be practiced already in the universities to ensure that graduates are equipped with these skills when entering the world of work.

Additional links:

- WEF_Future_of_Jobs_2023.pdf (weforum.org)
- HAMK unlimited article: Ask, don't tell – problem-based learning for competence-driven education in Zambia

1.2. Work-life responsive agropreneurship curricula

In Africa, the concern of unemployment, poor performing graduates, and lack of entrepreneurial mindset among the students is slowly waking up. It can be derived that the delivery of unresponsive curricula to the needs of the job market is the causal reason for the world of work and academia not having a common goal. The conclusion is that requirement of a paradigm shift in the approaches and methods of teaching must required and needed for the universities to come up with graduates able to solve the complex and wicked global problems and challenges, such as food security, biotechnology, pharmaceutical development, biodiversity management, climate change, and sustainability (Stagg and Dillon, 2022, Mugula et al. 2024). In Chapter 2 of this workbook, the different methods and pedagogical steps of embedding entrepreneurship and responsiveness to the curricula and teaching are being analyzed.

For work-life responsive curricula, the co-creation and input of the relevant stakeholders and employers is a necessity. As well as the insights from students and undergraduates. The involvement of stakeholders can be done through the method of DACUM (Developing A Curriculum) and by regarding the learning environment with all the networking partners and resources as a Collaborative Learning Ecosystem. These both will be further discussed in Chapter 3 of this workbook.

Additional links:

- HAMK unlimited article: The need for an educational paradigm shift in sub-Saharan Africa
- HAMK unlimited article: Challenges of using problem-based learning in Africa's higher education institutes and the way forward - HAMK Unlimited

1.3. Climate Smart Agriculture

When it comes to climate change, the agricultural sector is both a victim of the consequences, a cause of problems, and an important part of the solution. Farmers are among those most affected by climate change, due to the changing climatic conditions and unpredictability of weather patterns. Food production is threatened to deteriorate, especially in areas already suffering from food insecurity.

When talking about climate change, concepts of resilience, adaptation, and mitigation reflect strongly on the skills and competencies desired from the graduates. The wicked problems and challenges these graduates will be facing, require a set of skills helping them to observe the change and its causal relations and react to it with alternative and novel solutions. Most likely, the business-as-usual type of thinking and acting will be not needed, but those who can innovate and create new ways to mitigate and adapt will succeed. Working on innovations is often also like swimming against the stream. New innovations often require changes in behavioural patterns and resilience to stick to the problems and it's relevant aspects. Students can tend to guess and side-tracking, especially when building teaching around complex problem-based learning assignments, but with active mentoring and encouragement from the teacher side, this type of behavior can be harnessed for learning purposes and assessment and evaluation (Eischman et al. 2020).

Additional links:

- Agriculture and climate change challenges and opportunities at global and local level (fao.org)
- Climate-smart agriculture case studies 2021 (fao.org)
- FAO provides a free online learning course about CSA: Course: Introduction to climate-smart agriculture (fao.org)
- Climate-Smart Farming Helps a Community in Kenya Thrive in the Face of Climate-Change (worldbank.org)

2. CONSTRUCTIVE ALIGNMENT

Constructive alignment is a concept that helps educators and educational institutions better understand and implement curricula, and syllabi in which the learning objectives, the implementation of teaching and assessment are mutually aligned. Not to forget the teaching and assessment methods that will support the attachment of the student and give the student measurable and achievable learning outcomes.

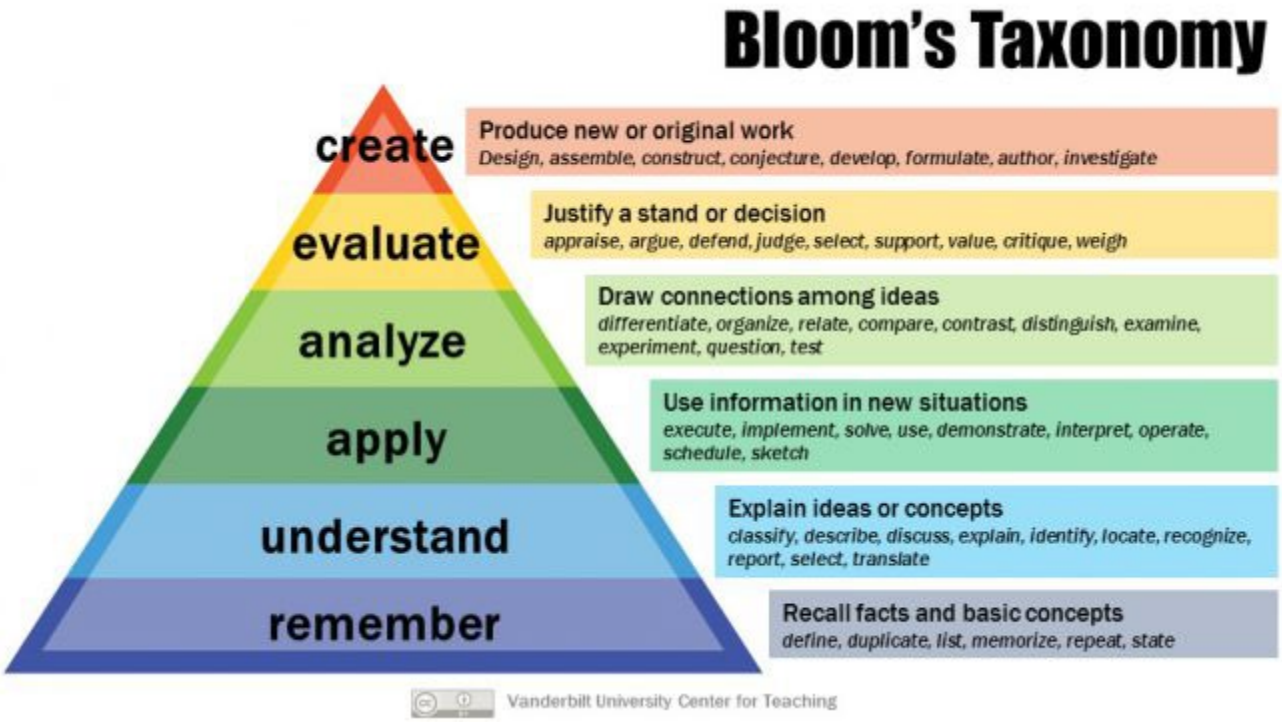
Additional links:

- Teaching Teaching & Understanding Understanding (1/3) - YouTube
- Teaching Teaching & Understanding Understanding (2/3) - YouTube
- Teaching Teaching & Understanding Understanding (3/3) - YouTube

2.1. Bloom's taxonomy

Benjamin Bloom (1913-1999) developed a taxonomy with levels of cognitive learning. In Bloom's taxonomy, competence is divided into six levels, and the processing of information

becomes more complex as the levels move upwards. Levels are (from least complex to the most complex) knowledge, comprehension, application, analysis, synthesis, and evaluation. These are the levels of the original Blooms taxonomy, the revised Bloom taxonomy (2001) the level of creation is added and knowledge and comprehension are combined into a remember. The revised version is designed to better reflect precisely the 21st-century skills and demands of the world of work. since it must better include the aspect of critical thinking (Bachmann 2018).



Picture from Bloom's Taxonomy | Center for Teaching | Vanderbilt University

Additional links:

- PODCAST #13 - What is Blooms Taxonomy? (youtube.com)

2.2. Learning outcomes

Learning outcomes describe what one should be able to do and comprehend at the end of the degree programme, course, learning assignment, and activity. Sometimes the synonym for learning outcome is learning objective. From learner's perspective it can be considered that during the learning process learners' state of knowledge and skills will achieve a new state. Learning outcomes help the learner to comprehend state learning is aiming at and clarifying the action and resources needed for the transformation of stages to happen. As with all objectives and goals, it is important that the goal is achievable and realistic but also ambitious enough to

motivate the learner. Also, it must be assured that the prior state of knowledge and skills is for the learner to be able to achieve the new target aka learning outcome.

It is also highly important for learning outcomes to be clearly formulated and “SMART” (see picture below) meaning that learning outcomes should be specific, measurable, attainable, relevant and timely. In other words, this means that learning outcomes should be revised and checked from time to time to see if relevancy and timeliness are present in the learning outcomes. For specific, measurable, and attainable learning outcomes we must be able to formulate and phrase learning outcomes in a way that they support the learner's action and that the output of the learning process can demonstrated and proven to be achieved.

This Photo by Unknown Author is licensed under CC BY

The benefit of clear learning outcomes is often reflected in the learner as well. When learning outcomes are clearly stated, commonly agreed and openly discussed in the classroom, students commit to learning and much more actively allocate their time and resources to the learning assignments since they know what is expected from them and that they know they can achieve the outcomes (Bachmann 2018).’

2.2.1. How to write competence-based learning outcomes?

According to Kennedy et. al (2006.) the framing of the learning outcomes can often start from the content and material, meaning that the content is decided and implemented and taught by the teacher, and assessment as well is solely based on the content. Emphasis is on teachers'

input rather than students' output. For competence-based learning outcomes, we must ponder the question, what are again the competencies learner should acquire after the course and in what matter can the student achieve the desired competence? Thus, the learning outcome is not seen through the course content or material, but the starting point of writing and formulating should start from the question – What the learner can do after the course/module/semester/degree programme? This "can do" statement in learning outcomes is introduced by Mager, 1998 and emphasizes the difference between input- and output-oriented teaching.

Aims	Outcomes
Know	Distinguish between
Understand	Choose
Determine	Assemble
Appreciate	Adjust
Grasp	Identify
Become familiar	Solve, apply, list

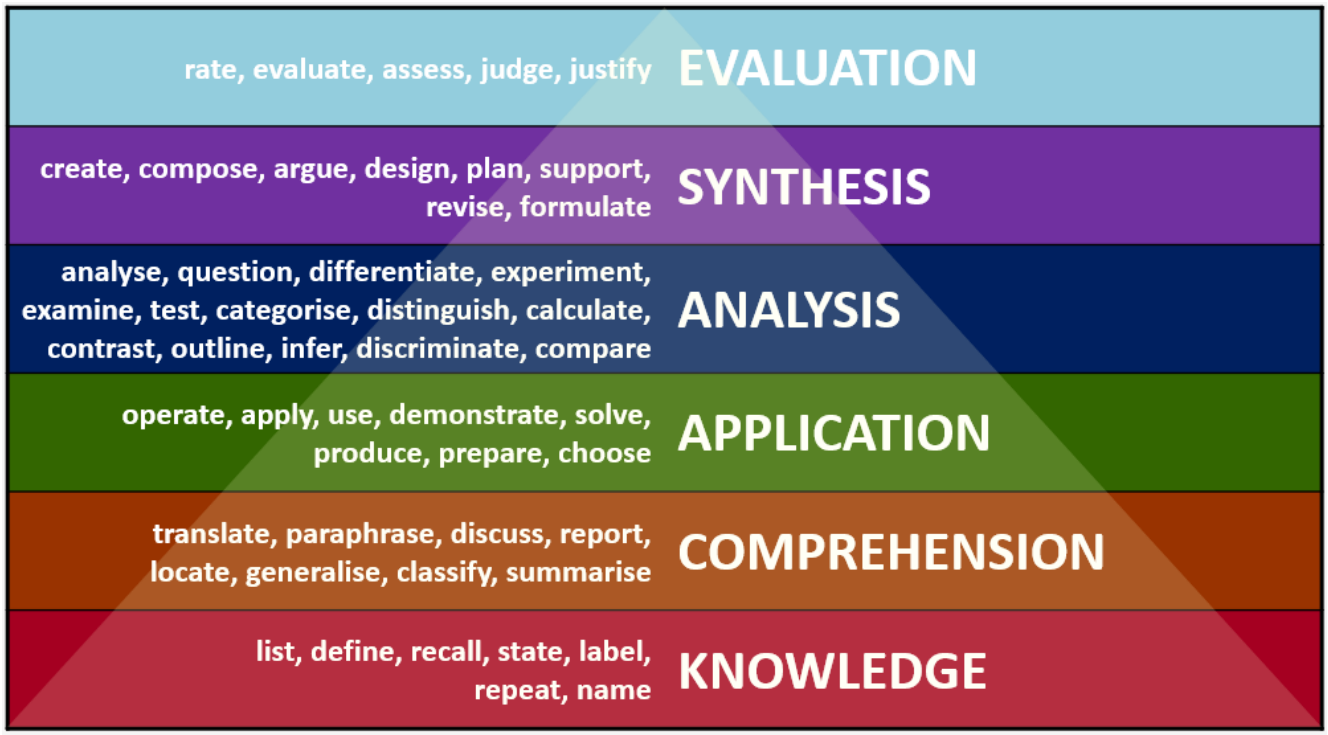
Examples of verbs used in writing aims and learning outcomes (from Kennedy et. al (2006) according to Fry et al., 2000 p. 51)

Table above shows that learning outcomes are to be action-oriented and student-centred. The verbs used for learning outcomes describe the active behaviour and how it will be presented and shown. Verbs shouldn't be vague or unclear or too conceptual or complicated. In addition to the verb the object of action should always be present in a clearly stated learning outcome. Instead of just writing "After this course, the student is familiar with soil chemistry and knows the relevancy of soil chemistry in agriculture." rather formulate the learning outcome with a clear aim and use an active verb – "After this course, the student can identify the key factor of soil chemistry and can apply the key factors to agricultural demands." This kind of phrasing already gives a more realistic and comprehensive description for the learner and helps them to identify what is needed from them and what this type of input to reach the learning outcome requires from them. It already also gives an idea on what kind of learning assignment will follow. When familiarizing themselves with soil chemistry students can passively just listen to lectures or read a book, but when the aim is by the end of the course identify the key factors, it already puts the learner in an active position in which they are the ones to determine what is relevant to know and what is not. This can be demonstrated through different learning assignments, such as case studies, observations, and reviews, all of which require resources and active participation from the learners. Applying sets a target for learners to first identify the demands of agricultural

sector and then reflect how the demand is connected to soil science". A learning assignment given could be for example about liming and how widely it's used in by the agricultural sector and how it affects the cation exchange capacity in agricultural soil and arable land. Student could be given the assignment to collect data from the statistics, community, input industry and themselves comprehend the relations and linkage between soil chemistry, farming operations, and the agricultural industry.

This example also highlights the aspect of having the focus on the outcome. How student can show the learning has taken place, rather than, what theory student needs to remember or know. Remembering or knowing is not putting the learner in an active and constructive role. It can even be that the learner knows the theory but is not succeeding in presenting the theory orally or apply it on any level. In case of liming, the learner can understand the neutralizing purpose of the lime but can't say how much to add per hectare and what environmental risks the overuse can cause. To bring us back to the 21st-century skills, this kind of learning outcome is useless in the eyes of the world of work where applicable and development-and innovation-oriented creators are needed.

Learning outcomes are like guide signs for learners and it is advisable to recall and remind about the learning outcomes during the module or semesters and remind the learners where the process of learning is heading and to give the learned feedback if the gap between the initial state of knowledge and skills has narrowed during the learning process.
The picture below follows the domain structure of Bloom but provides possible active verbs to be used when writing learning outcomes:



File:Blooms Taxonomy from Newton et al 2020.png - Wikimedia Commons

The teaching approach where the perspective of achieving higher-level thinking skills, in which learners apply, analyze, interpret, explore, compare, evaluate, build, and create new knowledge is often defined as Deep learning (Ruhalahti 2022). The opposite concept to this is Surface learning in which the learner simply just memorizes and learns the content without any critique or reflection of the prior knowledge. Competence-based learning outcomes are highly supportive to deep learning and aim students towards active participation, collaborative learning and knowledge building (Ruhalahti et. al 2021), not to forget that student community, self-study phases of the learning process and digital learning platforms and blended learning.

Additional links:

- For Europe the Bologna process has restructured the learning outcomes and systematically synchronized them in all EU member states: The Bologna Process and the European Higher Education Area | European Education Area (europa.eu)
- Writing and Using Learning Outcomes: a Practical Guide
- Deep and Surface Learning : https://youtu.be/KnlynokRfd4

2.3. From Curricula to Syllabus

Competences can't be solely only on the level of curricula but also on the changing mindset of teaching staff towards constructive teaching methods and participatory learning assignments and tasks. According to a meta-analysis by Freeman et al. (2014), traditional and passive teaching methods where students can sit in lectures are 1.5 times more likely to fail when compared to the teaching methods in which the students go through participatory and activating teaching and learning methods. Thus, a more constructivist teaching approach supports student contribution and success in graduation and passing the courses. Participatory teaching methods also offer a learning platform for competence building, where students have an active role in the creation of the teaching materials. In this setting, students are not given ready-made answers through lectures. The approach is student-centered instead of teacher-centered. and in this method, the teacher is supposed to "ask, don't tell" (Freeman et al., 2014) Still, instead, teachers are in the role of facilitators to guide the students toward relevant and reliable data and knowledge building by proposing questions to the students and making them thus active in the process of thinking and learning and finding the causalities and constructive and cognitive skills. At the same time, they simultaneously develop the skills appreciated by the world of work.

In this workbook, the methods of Problem-based learning (PBL) and Entrepreneurship pedagogy (EP) will be introduced as the methods to apply the competencies from the level of Curricula to the level of Syllabus and implementation. Thus, these methods are at the core of the AgrGROW project.

The integration and implementation of PBL curricula require deliberate planning for suitable methods and techniques to facilitate the best flow of PBL stages in the PBL cycle. The same flow also follows during the teaching and learning process. This is because, competence-based activities are effectively guided by PBL phases (Yew and Goh, 2016). Recent studies have also highlighted all PBL phases to be equally influential in the learning process of the students (Yew and Goh, 2016).

2.3.1. Problem-based learning (PBL)

In PBL, the teacher introduces the learner to a real-life challenge, usually involving a company, NGO or another type of stakeholder "owning" the challenge. After the problem and stakeholder

are introduced. The method of PBL follows a cycle of steps. Different studies have illustrated diverse forms of the PBL cycles phases as indicated in Table 1. Some studies elaborate eight phases (Poikela & Nummenmaa, 2006; and Kamari, 2024), four significant phases (Duch, et al., 2001) and three phase or stages (Yew and Goh, 2016). Through these steps, an alternative way of promoting professional skills and competencies is provided (Yew and Goh, 2016), not only focusing on theory, fact, and knowledge creation but also providing a learning environment where students can practice their critical thinking, analyzing skills, data collecting, networking among other skills.

Table 1: Comparison of different PBL cycles

Poikela and Nummenmaa, 2006 (PBL)	Duch, et al., 2001(PBL)	Yew and Goh, 2016 (PBL)
Problem definition	Problem definition and ideation	Problem analysis
Brainstorming	Self-directed learning (SDL)	Self-directed Learning
Problem structuring	problem review and application of knowledge	Clarification and reporting
Selection of focus area	learning consolidation and product prep	-
Study plan formulation	-	-
Knowledge acquisition	-	-
Knowledge integration	-	-
Clarification and reporting	-	-

The design of all PBL approaches begins with a problem definition, and finally ends with reporting on the possible products or solutions to the problems. In consideration of the distinctive phases in the PBL cycle, the following guidelines and attributes should be considered to enhance effective planning and integration of PBL and entrepreneurship and innovation skills in plant biology courses (Hjortsø, 2023, Table 2).

Additional links:

- HAMK unlimited article: University-industry collaboration through problem-based learning - HAMK Unlimited

2.3.2. Entrepreneurship pedagogy (EP)

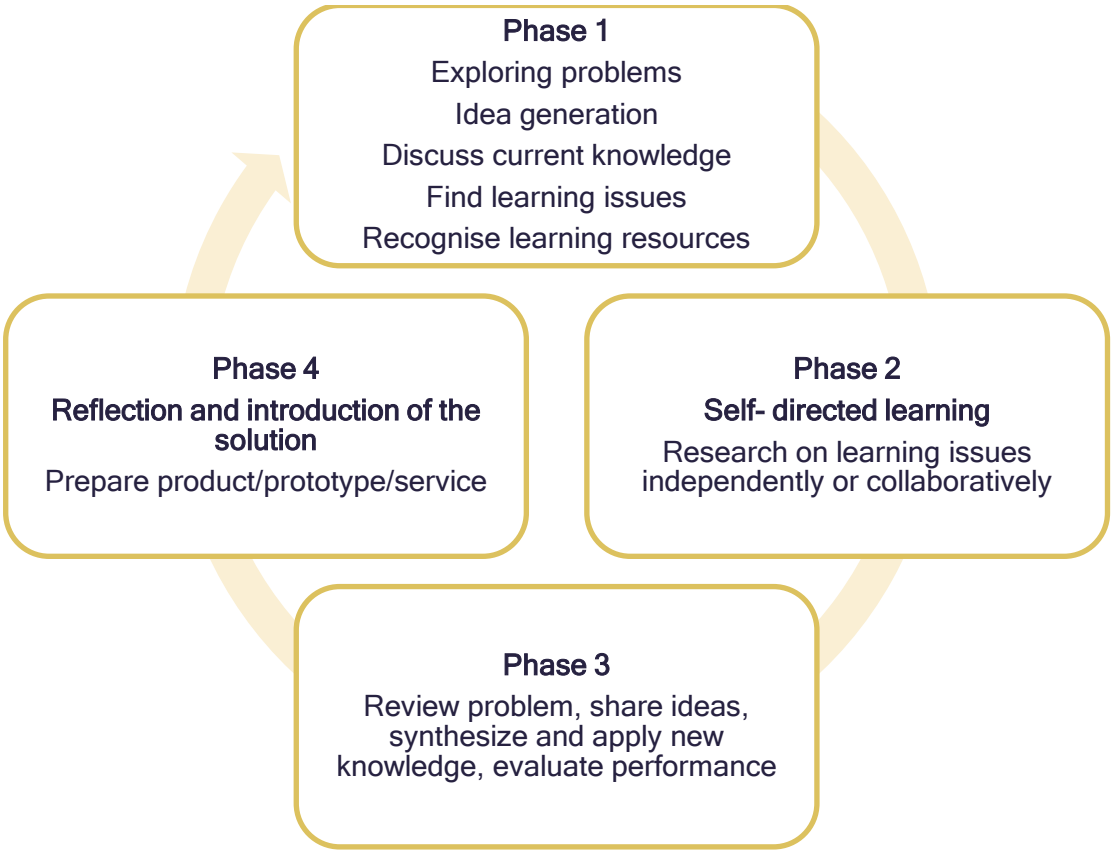
This teaching methodology emphasizes professional competencies, knowledge, skills, and mindset supporting entrepreneurial success, such as risk tolerance, creativity, resilience, and adaptability (Moallem, et al., 2019; Hjortsø, 2023).

Additional links:

- Education Sciences | Free Full-Text | Entrepreneurship Education Pedagogical Approaches in Higher Education (mdpi.com)
- Developing Transversal Competences and Skills - HAMK Unlimited

2.3.3. Implementation of PBL and EP

The implementation of PBL methods should be guided by all phases in the PBL cycle (Chian, et al., 2019) because they influence the students' learning (Yew and Goh, 2016). Although the criteria for designing an assessment rubric in a PBL approach is already described (Chian, et al., 2019), proper guidelines for systematic planning and implementation of PBL approaches are not well elaborated. Nevertheless, providing reasonable consideration to distinct phases in the PBL cycle (Figure 1) while planning and implementation of the PBL process is crucial (Figure 1).



The four distinct phases in the PBL cycle

The phases of the PBL cycle should thus be used to guide the integration of sub-activities that facilitate acquisition of entrepreneurial and innovation skills, knowledge, and attitudes in the teaching and learning. Understanding of key attributes of PBL design, criteria to be used and stages for each element provides an opportunity to facilitate the application and implementation of the PBL and entrepreneurship approaches. Three distinct stages are considered useful, and these include:

1. course unit preparation, where the teacher elaborates more on the course description and plan for teaching the courses
2. program designing period; here specific elements such as overall program learning outcomes, mode of delivery and assessment criteria are designed
3. during the writing of the teacher's instruction guide for the course before the teaching and learning occurs.

When the programs and courses are already designed, the implementation of PBL approaches may not necessarily occur without controls and benchmarks to ensure its full operationalization. At this point, both the teachers and academic managers must have deliberate and constant interface to operationalize the planned and designed PBL strategies. This process is expected to be highly interactive between different actors. To enhance these interactions, the following guidelines are useful to guide the operationalization of designed PBL methods in courses and programs (Table 2).

Table 2: Local implementation of PBL-E&I activities

Guideline (s)	Activities	Responsible actor
Designing the course	Course description, outcomes and delivery	Department committee
Validate course	Guarantee orientation to PBL - E&I	Department committee
Disburse course	Re-organise course; develop teaching	Course Teacher/instructor
Review and validate	plan/detailed course outline with PBL/E&I approaches	Teacher/Instructor
Course delivery	Refine sub activities, add concrete PBL challenges/cases/assessment rubric/ evaluation mechanism	Teacher/Instructor Teacher/Instructor
Classroom teaching	Operationalize/follow course plan; deploy teaching aids; and resources	Teacher/Instructor
Evaluate implementation in classroom	Feedback from students on process	Teacher/Instructor
Improve implementation process	Analyse data from feedback	Teacher/Instructor

After design of PBL activities within the courses and programs, their operationalization or implementation also require deliberate engagement between the teacher and academic managers to ensure that what was planned is actually implemented. In order to produce competent plant biology graduates, deliberate efforts should be taken to carefully plan and manage the entire process design right from program development, course disbursement, planning for implementation and actual operationalization of the planned PBL designs to leave no room for exclusion of the necessary students' skills and competences.

Table 3: Integration of PBL and entrepreneurship approaches in plant biology courses

Guideline	Criteria	Stage of implementation
Problem identification and definition	Real-life problem	Course preparation
Defining learning outcomes	competence-based	Programme design
Design sub-activities in course	Link to entrepreneurship-21st century skills	Course preparation
Decide on PBL organisation	University-external actors	Course preparation
Specify roles of teacher and students	Facilitation- SDL approaches	Course preparation
Decide on how to teach the course	"About, For, Through"	Course/program prep
Develop exam format	Use varied models/develop rubrics	Course preparation
Specify mode of students learning format	Expected knowledge, skills, competences	Course/teacher's guide
Highlight possible solutions	Focus on final product characteristics	Course/teacher's guide
Describe final product/alternatives	Use diverse solutions	Course/teacher' guide

(Source: Hjortsø, 2023; Kamari, 2024)

Additional links:

- The Seven Step Method of PBL: https://youtu.be/_4cOa27zXsw
- HAMK unlimited article: Building effective student teams in problem-based learning - HAMK Unlimited

2.3.4. Blended learning

As we already learned from the chapter about the learning outcomes, the use of digital learning platforms and blended learning can be highly supportive to move learners toward deep learning and active and engaged participation instead of surface learning.

The term blended learning is due to the form of learning that combines online teaching with traditional contact teaching. Alongside contact teaching, teaching is complemented with, for example, various online assignments and videos, Moodle tasks, and links to teaching material. Online and face-to-face teaching go hand in hand, merging and blending. This form of teaching often requires a digital learning platform, such as Moodle, to take place. Thus, the requirement of functional network connections and devices is a necessity for blended learning.

For successful blended learning, it is not enough to transfer an hour previously conducted in contact teaching online as such. The structure of a training or course must always be designed based on blended learning and it should be carefully planned which activities or learning assignments should be done remotely and online and which will be implemented face-to-face. The form of blended learning increases the variety and selection of learning tools and methods and brings a lot more options to the teacher to enhance learning.

The most crucial in blended learning is instructions. Teachers must ensure that instructions and guidance are clear and consistent and make sure students are aware of what is expected from them. Also, they might need some technical or IT support and guidance in completing the tasks, especially if the use of a digital learning platform is new to them.

Additional links:

- Why blended learning is (still) relevant (worldbank.org)
- CHAPTER 1 : Blended Learning – Guide to Blended Learning (col.org)
- The Basics of Blended Learning (youtube.com)
- Open Educational Resources: OER Commons

2.4. Assessment of competence-based learning outcomes

The tendency in assessment is of the aim for the **summative purposes**. Often summative purposes aim for the teacher to be able to provide a certification or to give the numeric or recorded evidence of students' assessed achievement against outcomes. Summative assessment too can be aligned with the course content and learning outcomes and is often used as judgmental and proof for external parties. Summative assessment usually occurs at the end of the period/semester/term and is objected to as a written test, exam, or thesis.

In addition to he summative assessment focus, especially in relation to the competence-based learning outcomes, it is worth recognizing the purpose of the formative assessment.

The formative purpose of assessment is to facilitate the learning process and provide learners with feedback guiding the student to self-reflection and recognizing what the student has learned during the learning assignment. A clear difference compared to summative assessment is that formative assessment is done during the term/semester/etc. and that is highly based on a dialogue between the teacher and the learners (Bachmann 2018).

2.4.2. Practices of assessment?

It also should be identified that different assessment practices can occur in different stages of the learning assignment, course, module, semester, etc. Practices of the assessment can be categorized as assessments OF, FOR and AS (Bachmann 2018) as listed in the table below.

Assessment OF learning	Assessment FOR learning	Assessment AS learning
Similar to summative assessments. Often takes form in grade books, etc. Tasks given to the learner are for summative purposes only.	Facilitates students learning and acts as a learning tool. Provides constructive feedback promptly per learner/group By teacher or peers Engages the student	Both teacher and learner are setting learning objectives to encourage growth and development A chance to inform a student of the learning process and guide the learner to enhance the skills and competence

2.4.2. When to assess?

Also the timing of assessment if worth carefully considering if the aim of learning is to increase and constructively support the competence building of the learner.

If pre-assessment is done before or in the beginning of the learning assignment or activity aim is to provide a clear understanding of the initiative level skills of the learner. This can be done in the form of a quiz, test, task, or reflection, but more importantly, it will set goals and aims for

individual development for the learner, who will recognize the current competence they have and after recognition be able to identify what needs to be achieved to elevate their competencies and skills to the desired level and learning outcome. That is why, pre-assessment is usually self-assessment and individual assignment, but can be done in small groups.

When assessing the learning process, the aspect is to monitor and provide evidence of going towards the goal for the learner. Rather than giving learners grades or summative assessments, usually quick feedback or dialogue will provide learners a signal and indication of whether their learning process is on track and going towards set learning outcomes. How to achieve this is often through reflection, peer review, portfolio, etc. Assessment after and at the end of the learning process is thus a summary of the learning outcomes and to evaluate both the learning process and the outputs of the learning. These are often in the form of an exam, project, demonstration, presentation, etc.

It is vital to comprehend that assessment should be done in all of these three stages, to keep the assessment clear, focused, and supportive for the learner. If assessment is done only after the learning process is over, the learners have not been provided with feedback potentially guiding them to better learning outcomes and output. Thus, assessment should not only be about the assessment and evaluation about the outputs but also about how the individual learner has developed, evolved and improved in the process of learning. This type of constructive and formative assessment doesn't need to be solely in the hands of the teacher, but also peer assessment, group discussion, digital platforms for reflection, and learning journals can provide evidence and support for the learner's own reflection during the learning process

Additional links:

- Platforms giving the student the opportunity to do assessment AS learning:
  - Padlet
  - Moodle board
  - Discussion forum assignments
  - Rubrics - MoodleDocs
- Reflective Learning: Key to Learning from Experience - Evelyn M. Boyd, Ann W. Fales, 1983 (sagepub.com)
- Assessing Competency Based Curriculum (CBC) | Institute for Educational Development, East Africa (youtube.com)

3. STAKEHOLDER INVOLVEMENT

3.1. Collaborative Learning Ecosystems

In the AgrGROW context, a Collaborative Learning Ecosystem (CLE) comprises all the learning activities that take place across the boundary between the university and its surrounding social environment, the university's internal and external actors in society, and the tools and institutions that structure the learning activity. The external actors can be individuals or public and private organizations, both for-profit or not-for-profit, operating as formal or informal organizations. The learners can include university students, university staff, and/or various types of external actors. The ecosystem is also shaped by the social norms, rules, and other institutions that regulate the social interactions in the system. Finally, the system consists of physical structures and tools that are used in the learning process, or that frame the process, for example, computer programs, lecture halls, laboratories, industry workshops, and office space. The learning is ‘collaborative’ because it happens in collaboration between the external partner and the teacher and learner, i.e., some sort of action is taken by the external partner, for example, in the form of a ‘student challenge’ provided by the host organization, a presentation

of a problem the student will work on, access for the student to a physical resource used in the learning process (e.g., a field or a machine), or giving students feedback on a solution. Engaging with external actors adds an additional layer of complexity to the planning and delivery of education. However, involving external stakeholders in the curriculum delivery process may provide unique learning opportunities for university students by linking the learning process to real-life problems and experiences which the students otherwise have very limited access to. By engaging with the external environment, lecturers also gain new insights into the fields where their disciplines are being utilized in practice. Such insight can, in turn, help enhance the relevance and quality of the more traditional learning elements in the university. Thus, the collaborative learning environment can be highly motivating for both students and lecturers and benefit external actors by providing inspiration, actual solutions to their challenges, and access to potential future employees.

Additional links:

- HAMK unlimited article: Development through Design in a Creative Ecosystem - HAMK Unlimited
- HAMK unlimited article: Co-creation pedagogy from cSchool towards HAMK Design Factory - HAMK Unlimited

3.2 Diagnosing the functionality of collaborative learning ecosystems (CLEs)

All academic managers, teachers and external actors in knowledge co-creation and skills desire to see CLEs that meet their goals and expectations from society. To realize this vision requires deliberate efforts focused on possible strategies that enhance the effective functioning of CLEs. Effective CLEs are those that provide learning opportunities for students to acquire competences, skills, activities and abilities or attitudes that are needed in the real world of work. Well-functioning CLEs also enable higher education institutions (HEIs) to accomplish their core purpose of teaching, research, community engagement, and innovations through the delivery and implementation of competence-based and responsive curricula to the pressing needs and aspirations of society and the world of work. Therefore, instituting diagnostic activities to ascertain whether the existing CLEs function effectively, and appropriately to realize the required academic and non-academic

goals of the HEIs is necessary. Essentially, CLE diagnosis should help stakeholders understand how the local CLE works, the barriers and promoting factors influencing the CLE performance, and areas that require improvements to strengthen the relevance of HEIs to the needs of society.

The AgrGROW project has developed clear guidelines and tools for teachers, and academic managers to successfully diagnose and improve the functionality of their CLEs (Hjortsø, 2024). The key benchmarks that should be carefully considered in undertaking activities for effective diagnosis and improvement of CLEs to foster their relevancy and functionality to society include the following;

(a) Identification and quantification of collaborative learning activities in general within the existing CLEs. This involves mapping the different types and the extent of learning activities that take place within the CLEs. This will help us understand what and how much is already happening.

(b) In-depth investigation of collaborative learning activities to establish the nature, and extent to which problem-based learning and entrepreneurship innovation approaches are integrated into the available learning activities. In this plan, the experiences of teachers, students, and external actors within the CLE are elaborated further to understand how the CLE functions, what comes out of it, and how it can be improved with special attention to the different strategies used to apply PBL and entrepreneurship and innovation approaches in the CLE.

(c) Application of collaborative and participatory approaches in the development of possible strategies to strengthen the CLE with the key stakeholders. This strategy helps to understand the thinking of the university's external stakeholders on what works well and what could be improved with regard to using the external environment as a learning opportunity for students, staff, and external actors.

(d) Exploring and profiling the required graduate competencies for employability and integrating activities that promote acquisition of such desired competencies. This benchmark helps to produce a clear understanding of what competencies, skills and knowledge different types of employees expect the students to have when they graduate.

The periodical diagnosis of CLEs ought to be one of the cornerstones in ensuring the effective delivery of competence-based curricula that enhance the relevance of HEIs to society. These periodical checks will also be instrumental in identifying and fixing loose gaps within the CLEs to meet the increasing expectations of society from HEIs. Thus, diagnosis, coupled with proper mechanisms for monitoring and evaluation of CLE activities will contribute to realizing vibrant leaning ecosystems that significantly facilitate the core roles of universities and delivery of society-driven curricula in the 21st century.

3.3. DACUM

DACUM is a method where stakeholders are involved and asked to give their contribution to finding out what should be taught to students and what type of skills and competencies they hope to perceive and learn before graduation. The method is co-creative, and it includes various steps eventually giving the educational institution an insight to what are the learning objectives and goals to be formulated in the curricula, what are the pedagogically sound ways of transferring the desired skills to the teaching and learning assignments, and how the competencies appreciated by the world of works should be assessed and evaluated. DACUM holds in the aspect of constructive alignment and can give educational institutions a cohesive justification for curricula and syllabus revision.

Additional links:

- HAMK unlimited article: Competence-Based Curriculum: Perceptions of the DACUM Method in Sub-Saharan Africa - HAMK Unlimited
- CBE_DACUM_SCID-article.pdf (unesco.org)

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