African Higher Education Leadership in Advancing Inclusive Innovation for Development / **AHEAD**

AHEAD

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TRAINERS' TOOLKIT:

Module "Innovation Management in Low- and Middle-Income Countries"

Work Package 2.3

Erasmus+ Programme

Capacity Building in Higher Education

TRAINERS' TOOLKIT

For Open Educational Resource

"Innovation Management in Low- and Middle-Income Countries"

African Higher Education Leadership in Advancing Inclusive Innovation for Development / AHEAD

585919-EPP-1-2017-1-RO-EPPKA2-CBHE-JP

Work Package 2.3

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I. Module Overview and structure

Module overview

We are living in the period of accelerated transition, marked by complex and profound transformations in all areas of activity. The scale of innovation is primarily reflected in the high pace of development of new products and technologies, but the changes are not just about tangible things. Within organizations, there are more and more innovation actions oriented towards business management methods, organization and configuration, which contribute to obtaining sustainable competitive advantages.

At the same time, innovation manifests itself in society in general, materializing in new strategies, concepts, ideas and organizations that address social needs - from the labour market and working conditions, to education, health and community development.

The current importance of the activities of introducing the new can be explained from the perspective of the transformations in the economy and society, determined by the increase of competition, by the technical progress and, especially, by the unimaginable development of information technologies. The new context corresponds with fundamental changes in economic models that are an important support for the development of low- and middle-income countries.

The character of the economies in these countries is traditional, production-oriented, prosperity being planned through extensive measures to increase agricultural production, housing construction, the establishment of traditional factories.

In the current context of economic globalization, it is necessary for these countries to focus on the real sources of prosperity and capital in the new era, which are not represented by material goods, but by human thinking, knowledge and innovation. This is a fundamental change in the economic model, in which the emphasis is on the development of intangible resources, inventions and know-how, and on their transformation into sources of innovation. The phrase "knowledge-based society" emphasizes this new orientation.

From this perspective, innovation management is a new paradigm of approaching innovation, characterized by the application of specific models and rules. This module "Innovation Management in Low- and Middle-Income Countries" is composed of 8 lectures that describe specific aspects of innovation management in these economies.

Module structure and workload

Lecture.1 3 academic hours (2 hours in-class and 1 hour independent learning)	**National, regional, sectoral and technological innovation system** *Annotation*: Lecture 1 analyses and evaluates the role of the innovation system at national, regional, sectoral and technological level. It describes the innovation systems at these levels in terms of structure, elements and factors that determine their functioning.
Lecture.2 3 academic hours (2 hours in-class and 1 hour independent learning)	**Innovation processes and structures** *Annotation*: Lecture 2 addresses the essential aspects of innovation processes by presenting the notion of innovation in a narrow and broad sense, which allows for a conceptual clarification while presenting the forms of research as constituent elements of the innovation process. Furthermore, the lecture introduces different models of the innovation process that can be adopted in low- and middle-income countries.
Lecture.3 3 academic hours (2 hours in-class and 1 hour independent learning)	**Innovation leadership** *Annotation*: Lecture 3 explores different approaches to leadership and discusses in more detail the qualification, behavioural and situational approaches. It explains differences between transactional and transformational leadership. Knowledge management is emphasised as one of the key functions of an effective leader. Such issues as management of learning organisations and leadership for innovation are also discussed.
Lecture.4 3 academic hours (2 hours in-class and 1 hour independent learning)	**Types of innovation** *Annotation*: Lecture 4 analyses different types of innovation, including: product innovation, process innovation, marketing innovation, organizational innovation; radical innovations versus incremental innovations; sustaining innovations versus disruptive innovations; open innovation versus closed innovation. The difference between innovation and invention is also discussed.
Lecture.5 3 academic hours (2 hours in-class and 1 hour independent learning)	**Open innovation** *Annotation*: Lecture 5 offers a perspective on open innovation as a recommended model for an organization that pursues accelerated progress and not only relies on its internal knowledge, sources and resources to innovate products, services, business models, processes, etc., but stimulates innovation through more external sources that integrate external partners such as customers, research institutes or suppliers in the innovation process.
Lecture.6 3 academic hours (2 hours in-class and 1 hour	**Knowledge transfer** *Annotation*: Lecture 6 emphasizes mutually beneficial collaborations between universities, companies and the public sector through the systematic process of knowledge exchange and learning from the

independent learning)	experience of others that is generated by the transfer of practical or theoretical knowledge.
Lecture.7 3 academic hours (2 hours in-class and 1 hour independent learning)	**Technological learning, technological catch-up, technological leapfrogging** *Annotation*: Lecture 7 presents technology as a key tool for stimulating economic growth that plays a central role in achieving social welfare goals that can hardly be reached through the conventional economic measures. Through the rapid and widespread deployment of technologies in and between developing countries, they can rapidly reduce the gaps with economically advanced countries.
Lecture.8 3 academic hours (2 hours in-class and 1 hour independent learning)	**Innovations exploitation and management** *Annotation*: Lecture 8 discusses practical aspects of exploiting innovation in order to transform innovative ideas into valuable economic and/or social results. This is achieved through the process, which includes three distinct steps: conception, exploration, and exploitation of innovation. The defining aspects of these steps are analysed in detail. The lecture provides an overview of the STI priorities in the East Africa Community Countries, with a focus on Tanzania, Kenya and Uganda. In addition, the final section of the lecture provides general information on the management innovation that plays a crucial role in the framework of the development processes.
Final project 6 academic hours (independent learning)	**Final exam / E-portfolio of case studies of innovation management / Essay: Managing the implementation of an innovation**

This module is a unitary whole that integrates the 8 lectures by gradually presenting the concepts depending on the level of complexity and difficulty of understanding as well as application in practice. At the beginning, elements related to the structure and organization of innovation systems at different levels are presented. After that we move on to the presentation of the essential elements of innovation processes. The study continues by approaching the aspects of leadership and management in these processes, after which the innovation is discussed under all the defining aspects, with emphasis on the open innovation that has the potential to accelerate the transformation processes. This is facilitated by the widespread adoption of technologies in developing countries, supported by a good management that can generate good exploitation.

The defining notions that integrate the 8 lectures can be summarized on the route:

System → Model → Management → Innovation → Open innovation → Knowledge transfer → Technologies → Exploitation

The module "Innovation Management in Low- and Middle-Income Countries" highlights the fact that innovation is not an uncontrollable force, linked exclusively to inspiration and creativity, it is not the prerogative of certain companies, elite, or developed countries, and it does not depend on magic formulas, accessible only to certain organizations or countries. In fact, it is about good management.

The module foresees 30 academic hours of workload, including 16 hours of in-class learning and 14 hours of independent learning. The hours of in-class and independent learning are equally distributed among the lectures (3 hours in class and 1 hour independent learning). The development of the final project requires about 6 hours of preparatory work (independent learning).

II. Expected learning outcomes

Learning outcomes

As a result of engaging with the learning materials in this module, learners are expected to develop the following knowledge, skills and competences:

Knowledge	
Knowledge	► Structure and elements of innovation system at national, regional, sectoral and technological level ► Features, elements, phases and models of innovation process (supply model, demand model, coupled model, network model and open innovation model) ► Types of innovation: product innovation, process innovation, marketing innovation, organizational innovation; radical innovations vs incremental innovations; sustaining innovations vs disruptive innovations; open innovation vs closed innovation ► Benefits and tactics of open innovation ► Qualification, behavioural and situational approaches to leadership, characteristics of transactional and transformational leadership, and leadership for innovation ► Concept of knowledge transfer and common approaches and techniques used for knowledge transfer ► Processes of technological learning, technological catch-up and technological leapfrogging ► Innovation exploration and innovation exploitation processes; management innovation
Skills	► Explain interdependence and interconnection among the elements constituting the innovation systems ► Compare and contract different models of the innovation process ► Explain the specifics of innovation (driving factors and constraints) in low- and middle-income countries ► Argue for benefits of open innovation for an enterprise ► Relate the processes of innovation leadership, knowledge management and management of learning organisations ► Analyse the specifics of knowledge transfer in low- and middle-income countries ► Identify and explain key factors supporting technological learning, catch-up and leapfrogging at country and enterprise level

	► Relate the priorities of the EASTECO Strategic Plan 2017/18 – 2021/22 to the developmental challenges faced by East African countries
Competences	► Systemic understanding of innovation (incl. innovation systems at different levels, innovation process, innovation types, impact of science, technology and innovation policies on the uptake of innovation in low- and middle-income countries) ► Awareness of the value of innovation for sustainable and inclusive development in low- and middle-income countries

III. Methodological guidelines

General notes

This course is designed to provide foundational knowledge on innovation management in Low- and Middle-Income Countries. It is a basic learning material in the topic, separated into sub-topics: 8 lectures. The course is intended for teaching staff, students, trainers, administrative staff, librarians and others who are interested in studying innovation tools to support the development of economies in countries with gaps.

The course is built on the rationale that long-term improvement in research and innovation capacity requires continuous investment into building specialized skills among staff, faculty and students. Skills for innovation management are universally relevant to all innovation and research activities of higher education institutions (HEIs). Universities in Partner Countries (PCs) are in excellent position to assume leading roles in innovation that addresses societal challenges and contributes to inclusive development.

Since enterprises in the three PCs - Kenya, Tanzania and Uganda - are less likely than European business to invest in innovation and research, PC universities receive large portions of their research budgets from public funds, which naturally are oriented towards the public good and national developmental priorities. Thus, PC HEIs are already expected and involved in contributing to national development and put efforts to address social challenges. Given that large groups of the population can be characterised as low-income consumers and economic growth in the three PCs contributes to rising inequality, the potential for the development of inclusive innovation is especially high in these countries. AHEAD project is developed with a view to improving HEI capacity to lead this process.

The course is a unitary whole composed of 8 lectures, which progressively approach the knowledge of innovation management, starting from the primary definitions of notions, continuing with the aspects of identifying learning methods and solutions, and concluding with the aspects of innovation exploitation.

The course is integrated in the AHEAD website in a form that is suitable for individual learning and is downloadable for the use in traditional courses. Each lecture is accompanied by a multiple-choice test and a list of resources for further reading. The materials can be further used by students and alumni, as well as researchers and faculty who wish to develop a course on the subject or to include innovation management as a sub-topic in other courses.

This toolkit is designed to aid the delivery (teaching/training) of the module "Innovation Management in Low- and Middle-Income Countries" based on the open educational resources (OERs) in a traditional learning environment: instructor-led or trainer-led course at an education or training institution.

Each lecture in the course addresses specific issues and topics. For convenience, these are indicated in the section on class structure.

Instruction and in-class participation

Instruction should respect the culture of instruction prevalent in the educational institution. However, teachers should note that this program is specifically designed to facilitate seminar-type training. In this context, lectures should be kept to a minimum, and classroom study should be based on discussions and the presentation of examples and case studies. It is desirable that the audience have read the necessary readings beforehand.

The purpose of the training activities is to encourage debate on the topics covered and to increase creative thinking and training in innovation management, with specific emphasis on the peculiarities of Low- and Middle-Income Countries. For students who have more advanced knowledge, bibliography for additional reading is suggested. It can be used for a deeper exploration of the topic.

It is desirable that students come to class prepared in order to have a participatory attitude and contribute to class discussions and learning activities proposed for group solving. It is recommended to involve in the debate guest professors recognized for their work in the field, as well as entrepreneurs who achieved outstanding results through the use of inventions and innovations in their enterprises.

Each training session should include a group task related to the topics covered, for instance each group presents a practical example, a case study or an opinion on the issue under discussion. The tasks assigned to each group should be able to be solved by studying the module and in addition should involve elements of creativity and/or debate, as well as the improvement of the students' oral presentation skills. It is also recommended that group tasks require the resolution of interdisciplinary issues, which involve contributions from different fields. Examples of learning activities that could be used as in-class group assignments are provided in the section "Class structure and learning activities".

Important note on the reading material and further readings: the content of the reading and the recommended titles constitute a proposal to deepen the knowledge of the subject covered. If the length of the material is considered too long, instructors can select only a few sections from different readings or choose only certain readings.

Prerequisites

There are no formal prerequisites for this course. However, the course is intended for teachers, researchers and students who want to work in innovation, both theoretically in the development of new innovation solutions and practically in the implementation of innovations and innovation models, at the microeconomic level, in enterprises, but also at macroeconomic level in the national economy.

IV. Assessment and grading

Assessment options

Below are some assessment options, which are designed in the form of a list from which each teacher/trainer can choose the desired assessment elements based on their own assessment plan and taking into account the institutional context and the objectives of the course.

► *Final exam*

It is recommended that the final exam contains both multiple-choice and open-ended questions. The duration of such an examination can vary from 1 hour to 1.5 hours.

For students of advanced level or in the case of practice-oriented instruction, an examination based on case studies is recommended. If this option is chosen, students can be asked to analyse a case study through open-ended and multiple-choice questions. The duration of the examination could vary from 1.5 hours to 2.5 hours, depending on the complexity of the case study and the number of aspects analysed.

Teachers/trainers can also opt to have an intermediate exam.

► *Individual/group e-portfolios of case studies of innovation management*

The selection of case studies can take place throughout the course, and the final e-portfolio should be due by the end of the course.

Formal requirements regarding length: between 3,500 and 5,000 words.

The electronic portfolio aims to introduce and familiarize the student with the process of exploration, research and analysis in the field of innovation management. One case is a synopsis of a real-world situation facing an enterprise that promotes innovation. The main result of the e-Portfolio should be the presentation, analysis and detailed evaluation of 2 case studies of innovation management, with a special focus on the economic impact achieved in each case and the challenges faced by this initiative. Papers that discuss high-quality case studies should present an interview with at least one company that manages innovation processes. In addition, multimedia artefacts should be presented, such as photograph and audio files from interviews. Teachers/trainers can develop the approach to implementing this assignment according to the needs of the students and their level of knowledge in the related fields.

Guidelines regarding the expected content of the case studies:

1. Areas of activity and major achievements of the enterprise in the field of innovation;
2. Elements which distinguish the analyzed enterprise from other enterprises in the field that do not routinely apply innovation in their activities;
3. Who are the innovators in the enterprise and what is their role in the organization;
4. Main idea of the innovations and their estimated efficiency;
5. The problems, challenges and opportunities that the company encounters in the development and application of innovations, related to, for example, financing, sustainability, management (operational or strategic), market access, marketing, personnel;
6. The general evaluation of the economic impact and viability of the analyzed innovation solution, but not limited to financing, sustainability, management (operational or strategic), market access, marketing, personnel;
7. Lessons learned and good practices that can be drawn from this case;
8. Recommendations for business activities that can improve performance.

► *Managing the implementation of an innovation*

The implementation of this assignment will be possible, if the university (teacher/trainer) delivering this course manages to engage innovative companies and if these companies agree to involve students in the innovation process they carry out (or at least share information related to innovation management in their company with students).

The format of the assignment: an essay of 4,000-5,000 words. This project should be due by the end of the course. By implementing it, students will address the challenges of managing the development of an innovation in an enterprise. The aim of the activity is to make students reflect on the challenges inherent in being innovative. The content of essays can include the following elements:

1. Presentation of an enterprise, the field of activity and technological performance;
2. Sectoral and technological innovation systems analysis;
3. Designing innovation processes and related structures;
4. Analysis of the type of leadership;
5. Adopting the type of innovation and discussing its open versus closed character;
6. Analysis of the knowledge transfer opportunity and of the technological options;
7. Economic exploitation of innovation.

This list can be reconfigured by the teacher/trainer to take into account the needs of the students and their level of knowledge in the related fields.

Grading and assessment

The assessment should comply with the rules of assessment and grading in the educational institution where this module is implemented.

In order to stimulate creativity, it is recommended that project evaluation prioritize innovative and creative ideas.

Proposed grading:

- ► Individual in-class participation: 5%
- ► Participation in in-class group assignments: 10%
- ► Final exam: 20%
- ► E-portfolios of case studies of innovation management: 15%
- ► Managing the implementation of an innovation: 50%

Code on academic honesty and plagiarism

Each institution implementing the course is encouraged to follow its own code or set of rules with regard to academic honesty, non-discrimination with regard to gender, ethnicity, religion or sexual orientation, open debate and respect for diverging opinions, plagiarism, etc.

V. Class structure and learning activities

Lecture. 1 National, regional, sectoral and technological innovation system

Learning outcomes:

After engaging with the learning material in this lecture, students should be aware of the structure and elements of innovation system at national, regional, sectoral and technological level, and be able to explain interdependence and interconnection among the elements constituting the innovation systems.

Workload:

3 academic hours (2 hours in-class and 1 hour independent learning)

Learning activity 1.1:

Objective:

Refresh the content of the lecture by naming the sectors of the national innovation system.

Task:

As you know, the national innovation system consists of four sectors. Which of the following are they? Mark √ the appropriate answers in the table below.

Sector	True	False
Production sector	☐	☐
Public sector	☐	☐
Informal sector	☐	☐
Production services sector	☐	☐
Institutional sector	☐	☐
Scientific sector	☐	☐

<u>Correct answer</u>:

Sector	Truth	Falsehood
Production sector	✓	☐
Public sector	☐	✓
Informal sector	☐	✓
Production services sector	✓	☐
Institutional sector	✓	☐
Scientific sector	✓	☐

Implementation procedure:

This exercise can be used at the end of the lecture. Teacher can ask students to name the four sectors and then ask them to summarize briefly what they remember about each sector.

Timing:

2 minutes are needed for marking true or false answers. 10 minutes can be allocated for summarizing the main points related to each of the sectors.

Learning activity 1.2:

Objective:

Analyse the case study and explain how it supports the innovation process.

Task:

Read the case study "World City Forum of Milano" provided below. Find more detailed and recent information about the initiative described. How do you assess this initiative? Does it support the innovation process? Why do you think so?

Case study "World City Forum of Milano, Forum della Cittá Mondo"

City of Milan, Department of Culture, Mayor's Office – International Relations and Department of Social Affairs

Established in 2011 with the objective of creating a space to share ideas, projects and proposals for the development of cultural policies, in particular ahead of the Expo Milano 2015, the "Forum della Città Milano" brings together over 600 associations representing nearly 120 international communities living in the metropolitan region of Milan. A unique project due to the variety of associations involved and their backgrounds and capacities, the Forum has been able to establish a true dialogue between the different communities and also with their local context, celebrating and sharing their traditions and contributions to the city of Milan. The Forum meets approximately every other month in plenary assemblies and in thematic groups like women and

Implementation procedure:

The case study can be given to students as an in-class group assignment, if the room where the class is conducted has computers or other devices connected to the Internet. It is important for students to find additional information about the case. If access to the Internet cannot be ensured during in-class activities, students can be asked to analyse the case study as a home assignment. Then, it can be discussed during the next face-to-face session.

Timing:

20-30 minutes should be sufficient for the analysis of the case study and a follow-up discussion.

Lecture.2 Innovation processes and structures

Learning outcomes:

After engaging with the learning material in this lecture, students should be able to define the process of innovation and describe its features and elements, distinguish and describe different models of the innovation process, and explain the scope of the innovation process management.

Workload:

3 academic hours (2 hours in-class and 1 hour independent learning).

Learning activity 2

Objective:

Explore participants' associations with the concept of innovation process; share ideas, experiences and opinions.

Materials: A4 paper sheets, one per student

Task:

1. Draw on an A4 sheet – landscape orientation – an empty diagram;
2. Fill in the diagram by writing down your first associations (words or word combinations) related to innovation process. Write down everything that comes to your mind;

3. Present / describe your diagram to your groupmates;
4. Compare your diagram / your associations with the diagrams / associations of your groupmates.

Implementation procedure:

This activity allows for exploration of ideas and notions that participants associate with the innovation process. It is particularly suitable as the first exercise of a longer training session. Teacher should explain the task to students and give them time to complete the diagram individually. Then, teacher should invite each student to share their ideas in front of the class and stick diagrams on a wall or a pin board. After everybody has shared their ideas, students should be suggested to study the diagrams of their groupmates (e.g. go to the wall or pin board, on which all diagrams are placed, and study them). Teacher should summarize the results of the exercise.

Timing:
2-3 minutes to write down associations should be allocated. Time for discussion will depend on the size of the group and on the number and quality of ideas (associations) shared. If this activity is implemented as part of a longer training session, 15-20 minutes can be allocated for the discussion.

Lecture.3 Innovation leadership

Learning outcomes:

After engaging with the learning material in this lecture, students should be able to describe qualification, behavioural and situational approaches to leadership and identify strength and weaknesses of each approach, compare and contrast transactional and transformational leadership models, and relate the concepts of innovation leadership, knowledge management and management of learning organisations.

Workload:

3 academic hours (2 hours in-class and 1 hour independent learning).

Learning activity 3.1 Leadership Collage

Objective:

Share and discuss students' understanding and views on leadership through a collage.

Materials: Before the class, teacher should prepare a variety of materials for collages. The materials can be very diverse and include: photos, flipchart paper, colour paper, marker pens, plasticine, crayons, excerpts from newspapers and magazines in different languages. Students could also be asked to look for materials themselves and bring them for the class.

Task:

Create a collage that would express your views and ideas of leadership. Use the materials provided. When ready, present your collage to your groupmates, explain them what each element of your collage means and why/how it symbolizes leadership.

Implementation procedure:

Teacher is recommended to:

1. Divide the group of students into smaller groups.
2. Prepare a large piece of paper, e.g. a sheet of flipchart paper for each group.
3. Ask each group to discuss and express their views and understandings of leadership in the form of a collage. Suggest students adding short written explanations, where needed.
4. Ask each group to place their collage on a table.
5. Ask participants to have a look at and study the collages of the other small groups and discuss the meaning of the chosen objects.
6. Summarize the discussion with the whole group.

Timing:

About half an hour should be allocated to group work for creating a collage and developing a scenario of its presentation (e.g. building argument for including certain elements and objects in the collage). The time needed for discussion of the collages will depend on the size of the group. Students should be allowed to spend about 5 minutes at another groups' table to study and discuss their collage. Additional 5-10 minutes should be allocated for summarizing the discussions and conducting a debriefing session.

Learning activity 3.2 Mastering Leadership

Objective:

Reflect on the competencies that a leader should have; build an argument for the importance of certain competencies for a leader.

Materials: A handout with a list of competencies characterizing a leader (one for each student); or the same list displayed on a ppt slide.

Task:

Michael R. Williams in his book "Mastering Leadership"[1] identifies the following competencies that characterize a leader:

1. Celebrating accomplishments

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[1] Williams, M. R. (1998). *Mastering Leadership: Key Techniques for Managing and Leading a Winning Team*. Thorogood.

2. Inspiring shared visions
3. Enabling others through networking and dialogue
4. Experimenting and trying out new ideas and options
5. Searching for opportunities, so taking the business forward
6. Recognizing people's contributions
7. Setting an example, which may involve some sacrifice
8. Challenging the process, i.e. questioning and not merely accepting the status quo
9. Strengthening others and building on their strengths

Working individually, please, rank these competences from most important to least important. Present and discuss your hierarchy with the whole group.

Implementation procedure:

The teacher should present the task and ask students to rank the competences. Students may be asked to build an argument explaining the importance of the top three competences selected by the student. Then, teacher should ask students to present the hierarchies and explain the ranking of the competences. The teacher should lead and summarize the discussion by commenting on the choice of most and least important competences (as selected by students).

Timing:

15-20 minutes can be allocated for ranking the competences and developing an argument. The time needed for presentations and discussion will depend on the size of the group. Every student can be asked to present his/her ideas within 5 minutes.

Learning activity 3.3 Ten-minute relaxation

Objective:

Practice relaxation in the educational/work environment; discuss how relaxation can help to overcome stress.

Task:

Creation of an innovation climate in the organization can be hampered by stress. A short relaxation exercise can help to overcome it. Do you agree? Why? Let's try to relax and discuss our feelings after the exercise.

Implementation procedure:

Teacher is recommended to:

1. Ask participants to sit comfortably on the (arm) chairs, so that their legs and arms are not crossed and their spine is under a natural load; ask participants to close their eyes.
2. Ask participants to start breathing deeply. After you say "start", ask them to inhale for 1, 2, and exhale for 1, 2, 3, 4. Let them stay with closed eyes breathing deeply for several

minutes. Then, finish the exercise by saying "stop" and asking students to open their eyes.

3. Ask students about their feelings and possible mood improvement, a sense of relaxation. Explain that this exercise can inspire them to find their own way to relax and reach energy balance.

Timing:

10-15 minutes should be sufficient to implement this exercise.

Lecture.4 Types of innovation

Learning outcomes:

After engaging with the learning material in this lecture, students should be able to describe major types of innovation and explain the specifics of innovation in low- and middle-income countries.

Workload:

3 academic hours (2 hours in-class and 1 hour independent learning).

Learning activity 4. Product innovation versus process innovation

Objective:

Distinguish between product and process innovations based on the analysis of case studies.

Tasks and implementation procedure:

1) Divide the class into 5 groups and assign each group a case study for analysis. Use the case studies from the list below (A-E), or find other examples. Let students analyse the cases for 15 minutes.

A. E-readers: https://goodereader.com/blog/electronic-readers/what-will-be-the-next-big-thing-for-e-readers

B. Action cameras - GoPro:
https://sites.google.com/site/goproinnovation/
https://gopro.com/en/us/news/honored-for-innovations-2018

C. Mobile phones - Apple:
https://theconversation.com/understanding-the-real-innovation-behind-the-iphone-79556
http://innovarsity.com/coach/bp_innovation_strategies_apple.html

D. Henry Ford's assembly line: https://www.assemblymag.com/
Google 20% Project: https://www.inc.com/adam-robinson/google-employees-dedicate-20-percent-of-their-time-to-side-projects-heres-how-it-works.html

E. McDonald: https://www.youtube.com/watch?v=jTageuhPfAM&feature=emb_title

2) Ask each group to make a short presentation of their case study; suggest them to include in the presentation at least:

1. Description of the product / innovation process
2. The need that generated these innovation solutions
3. The effects of innovation

3) Give each student a worksheet (the table below) and ask to determine, which characteristic (1-5) in the Table best suits each of the 5 case studies.

Short characteristic	Most suitable case A,..,E	Result to be discussed after completing the form
1. Improve an existing product		C
2. Innovate the level of methods used by employees		E
3. Develop an innovative product that solves a consumer problem in a new way		A
4. Innovate at the level of facilities		D
5. Develop a new innovative product that solves a new problem		B

4) Collect worksheets and discuss the results; analyse the correct results (provided in the last column of the table).

5) At the end, suggest students doing a summary exercise. Distribute to students a worksheet (the table below) and ask them to indicate, which statements refer to product innovation, and which refer to process innovation.

What kind of innovation is characterized by the following:	Product innovation	Process innovation
1. It appears as a result of the evolution of technology	✓	
2. It aims to streamline certain processes and perhaps even remove barriers to the production process		✓

		✓	
3.	It occurs as a result of changes in consumer needs, due to certain social, cultural or economic factors	✓	
4.	It is done at the level of equipment, technologies used or at the level of methods used by employees		✓
5.	It is done when you want to reach new market segments	✓	
6.	It is done to reduce production costs	✓	✓
7.	It does not have such visible effects on consumers, but it has significant impact on internal (company) stakeholders		✓
8.	It is done when you want to gain a competitive advantage	✓	

Other comments: The analysis of the case studies in class is conditioned by the availability of computers or other electronic devices and connection to the Internet. If there is no Internet access in the classroom, teacher can print out the case studies before the class and hand them out to students on paper. As another possibility, students can be asked to read and analyse the cases as a home assignment, while the other activities will take place in class (presentations, discussions, other tasks in tables/ worksheets).

Timing:

Between 40 minutes and one hour may be needed for implementing this learning activity, depending on whether students are asked to analyse the case studies in-class or prepare the analysis as a home assignment.

Lecture.5 Open innovation

Learning outcomes:

After engaging with the learning material in this lecture, students should understand the characteristics of open innovation in comparison with closed innovation. Students should also be able to identify and explain benefits of open innovation for an enterprise.

Workload:

3 academic hours (2 hours in-class and 1 hour independent learning).

Learning activity 5. How to apply open innovation

Objective:

Reflect on the methods used by different companies for the implementation of open innovation.

Task:

If you understand the principles behind the open innovation paradigm presented in the lecture, you should have a general understanding of how to apply open innovation. Although there is no a 100%-working "recipe" to use, we present some methods successfully applied by companies around the world to implement open innovation.

1. Contests of ideas / solutions

Examples of open innovation initiatives are two contests that took place in early 2020, in the context of the coronavirus pandemic - #EUvsVirus and The Global Hack, two global hackathons that called for solutions in all areas that suffered or needed a change.

Explore the contest webpages:
- #EUvsVirus: https://www.euvsvirus.org/
- The Global Hack: https://theglobalhack.com/

> Theme for reflection: What are the advantages of these contests for the companies that organize them and for the participants?

> Possible answers:

- On the one hand, soliciting ideas for noble causes helps companies to create positive image and strengthen the relationships with consumers.
- On the other hand, such competitions are perfect launching pads for young talents who want to develop a new product / service and also contribute to different causes.

2. LEGO

Explore LEGO's open innovation initiatives at the following webpages:
- Platform LEGO Ideas: https://ideas.lego.com/
- Operation of the LEGO platform: https://ideas.lego.com/howitworks

> Theme for reflection: How these open innovation initiatives work?

> Possible answer:

- LEGO's open innovation initiatives consist of fans posting personal creations with LEGO pieces and if they are voted for by enough fans, they are then evaluated and proposed for large-scale production.

3. PHILIPS

Explore PHILIPS' open innovation initiatives at the following webpages:
- High Tech Campus: https://innovationmanagement.se/2009/11/16/how-philips-open-campus-breeds-innovation/
- Innovate with Philips: https://www.supplierinnovation.philips.com/

> Theme for reflection: How these open innovation initiatives work?

> Possible answers:

- High Tech Campus, which is a Silicon Valley of Europe with more than 140 companies, allowed Philips to work in physical proximity to other companies, which inevitably influenced the exchange of resources and information forming the basis of open innovation.
- The platform Innovate with Philips supports users to share innovative ideas that can be taken, together with the company, to the production phase.

4. Quirky

Explore Quirky's open innovation initiative at the following webpage:
- Quirky: https://quirky.com/about-quirky/

> Theme for reflection: How this open innovation initiative works?

> Possible answers:

- It is a platform where users can share their product ideas through a form and then, each month, some of the ideas proposed are chosen to be further developed.
- For products that are not chosen, users (authors of these ideas) receive feedback.

Do you have a product idea? It wouldn't hurt to see what you can do in Quirky!

Implementation procedure:

This learning activity can be suggested to students for implementation after the introductory material in the lecture has been discussed. The case studies can be analysed as an in-class assignment. Depending on the size of the group and time available, teacher can opt: 1) to have the whole group analyse all case studies; 2) to divide the group in two smaller groups and have each group analyse two different cases; 3) to divide the group in four smaller groups and have each group analyse one case study. Students should be asked to read the cases and answer the questions (either individually or in smaller group). Then, teacher should lead a discussion based on each case, asking students to share their opinion, giving additional comments and summarizing the results of the discussion. If the room where the class is conducted does not have access to the Internet, teacher can prepare handouts with the given cases (print out the case studies before the class).

Timing:

The time needed for this learning activity will depend on the implementation mode chosen by the teacher. Students should be given about 10-15 minutes to read and analyse each case; about 30 minutes should be sufficient to discuss all four cases.

Lecture.6 Knowledge transfer

Learning outcomes:

After engaging with the learning material in this lecture, students should be able to define knowledge transfer and describe common approaches and techniques used for knowledge transfer, justify the reasons for technology transfer between public and private domains, and to analyse the specifics of knowledge transfer in low- and middle-income countries.

Workload:

3 academic hours (2 hours in-class and 1 hour independent learning).

Learning activity 6. Knowledge transfer: common approaches

Objective:

Reflect on the approaches to knowledge transfer; master the vocabulary related to knowledge transfer by giving definitions and examples of the concepts in question.

Task:

Knowledge transfer is the dissemination of knowledge from one organization, team or individual to another. Common approaches to knowledge transfer are: Mentoring, Coaching, Training, Mastery training, On the job training, Presentation, Documentation, Redeployment.

1. Find the most suitable description in the list below for each of these approaches:

Your answer	Characterization	Correct answer
	is an approach to education and training that implies that the participant has a completely perfect skill before moving on to the more advanced skill.	Mastery training
	is a relationship between an experienced person and a less experienced person.	Mentoring
	is the process of learning a profession, role or skill by doing a job under the oversight and guidance.	On the job training
	is a type of leadership that is accountable for the performance of a team or individual.	Coaching
	is a kind of education aimed at transferring applied knowledge and skills.	Training
	is the most efficient way to transfer knowledge between teams by transfer of people themselves.	Redeployment
	is information sharing session such as a lunch and learn program that allows teams to share information with each other on topics of interest.	Presentation

	is capturing knowledge as text, media and visualizations.	Documentation

2. *Provide examples on subjects in your area about:*

Concepts	Your examples
Soft skills	
Professional training	
Technical training	
Leadership training	
Management training	
User training	
Process training	
Certification	
Internal training	
Team building	
Improvisation	
On the job training	
Internship	
Apprenticeship	
Charrette	
Sprint	
Industry training	
Retraining	
Orientation	
Safety training	
Compliance training	
Simulations	
Business games	

If you need, you can find definitions of training types here:
https://simplicable.com/new/training

3. *Provide examples on subjects in your area about training methods:*

Concepts	Your examples

Lectures	
Demonstrations	
Virtual learning environment	
Collaborations and practice	
Improvisation	
Role playing	
Tests and certifications	
Cramming	
Rote learning	
Mastery learning	
Active learning	
Simulations	
On the job training	
Coaching and mentoring	
Orientation	
Apprenticeship	

If you need, you can find definitions of training types here:
https://simplicable.com/new/training-methods

Implementation procedure:

These three exercises can be implemented as individual or group in-class learning assignments. Teacher can prepare handouts with these exercises (1 per students / small group) and ask students work on them and then present their answers/ examples. Alternatively, teacher can put the tables on ppt slides and ask students to give answers/ examples as part of a discussion on the concepts related to Lecture 6. Depending on the time available, teacher can reduce the number of terms included in the tables (e.g. focus on the most important ones). It may also be helpful for the teacher to prepare his/her own examples of the given concepts to support the discussion, should the students face difficulties in giving their own examples.

Timing:

About 40 minutes should be sufficient to implement this learning activity. However, the time needed may differ depending on the level of preparedness of students.

Lecture.7 Technological learning, technological catch-up, technological leapfrogging

Learning outcomes:

After engaging with the learning material in this lecture, students should be able to describe the process of technological learning and relate the models of national learning dynamics to the context of low- and middle-income countries. Students should also demonstrate understanding of the processes of technological catch-up and leapfrogging, and explain key factors supporting their realization.

Workload:

3 academic hours (2 hours in-class and 1 hour independent learning).

Learning activity 7

Objective:

Reflect on the concepts of technological learning, technological catch-up and technological leapfrogging by providing examples of them. Analyse the technological learning strategy presented in the case study and suggest ideas for transferring it to the local context.

Tasks:

1) Define and provide examples of:

- Technological learning
- Technological catch-up
- Technological leapfrogging

2) Working in small groups, read and analyse the case study "Ceibal Plan" below. Outline the Technological learning strategy implemented through this plan. Re-work it for your own context to improve technological learning. Discuss your ideas in your small group.

Experiences and assessment cases

The Ceibal Plan is modelled after the "one computer per student". It is the first and only plan of national coverage. Such a plan is capable of making a difference in children, their homes, schools, and local environment. With the Ceibal Plan, Uruguay has set an example for Latin America of public policy that positions ICTs in a prominent place in the school restructuring processes and the search of better quality public education. Experts familiar with the Ceibal Plan have highlighted that such initiative goes beyond the school context and aims to foster human development, raising the questions of digital inclusion and access to knowledge. Being that equal opportunities are the project's major premise, it was the first American country with a universal

and compulsory primary education and was also the first nation that provided 100% of elementary students with access to computers and Internet.

Ceibal Plan: new technologies, pedagogies, ways of teaching, learning and assessing

Cristobal Cobo

Ceibal Foundation/Uruguay

The Ceibal Plan, in its quest for digital inclusion as a means to improve the quality of education, provide equal opportunities, and promote digital literacy in the educational community, provides technological devices and connectivity to Uruguayan students.

Since its inception in 2006, the Foundation set a goal to provide laptops to all students and teachers in public primary education (85% of school enrolment in the country), in order to give them access to information and communication tools within a framework of equity. The objective was for the impact of technology to cut across schools and reach households, the community and overall society.

Uruguay, a country with 3.4 million inhabitants and a literacy rate of 99.4%, achieved such goal in a few years. By 2010, Ceibal began to include junior secondary education, and provided laptops to students and teachers as well as connectivity to schools.

Ceibal has managed to provide and maintain laptops for 100% of students and teachers in primary and junior secondary education. In urban areas, the availability of connectivity services stands at 95%. Mostly found in non-urban areas, connectivity problems are addressed through a broad network of technical support. Nationwide, for 80% of the student enrolment in primary and secondary education, the availability of connectivity services exceeds 95%. Furthermore, Ceibal has implemented free internet access points in town squares, public libraries, and clubs, so that children in the most vulnerable sectors can have Internet access outside of school.

The technological context has changed dramatically. The gap between the poorest quintiles and the richest quintiles decreased radically in terms of access to technology. In 2006, 25% of households had a computer and 14% had Internet connection, while 25% of schools had Internet access (Vaillant, 2013). In 2013, the numbers increased substantially: 67% of households had a computer, 53% had Internet connection and 96% of schools had Internet access (International Telecommunications Union – ITU, 2014). Given the technological impact, the Ceibal Plan was able to focus its priorities on a new culture of teaching and learning through technology.

For example, since 2014, Uruguay has been one of the seven countries participating in the Global Learning Network, an initiative promoted by Michael Fullan, that is within the framework of a project called New Pedagogies for Deep Learning. In this network, teachers, managers, and decision makers are encouraged to exchange ideas, experiences and education innovations based on new technological contexts. Uruguay plays a strategic role in the Global Learning Network by collaboratively exploring the new teaching and learning methods the Ceibal Plan intends to develop throughout the entire education system.

The Digital Technology Laboratories (LabTed) are another example of the latest educational developments of the Ceibal Plan. The LabTeds are project based on working bodies that intend to answer or address students' questions or needs and whose final product is the manufacturing of a technological device. Technological devices are manufactured using components provided by Ceibal, such as robotics and sensor kits, video game programming, and audio-visual editing, all technological developments that bolster creativity, critical thinking and collaboration.

Another initiative developed by the Ceibal Plan, the Ceibal in English program, adopts an English teaching model combining online and classroom learning. As part of an agreement with the British Council, students of the fourth, fifth and sixth grades of primary education attend English classes taught online by an English native speaker via videoconference. Furthermore, classes are also taught by a local teacher who acts as a facilitator for the online classes and who is also in charge of implementing the guidelines and programs prepared especially for these courses. Teachers participating in this program receive special training to help them implement this training model.

The most recently published evaluation of English showed that this method brings about cross-cutting benefits for students, regardless of their socioeconomic context and demonstrates that learning is as rich as that of in-classroom learning.

Since 2012, the year the Ceibal in English program was launched, the number of English language students increased from 33,000 to 106,000 school children. Sixty-six percent of 6th graders achieved a proficiency level of A2 (advanced beginner, according to the Common European Framework of Reference for Languages: Learning, Teaching, and Assessment). In other words, they graduate from primary school with such proficiency level. These results are good news, a real motivation to keep working on both of these learning models and assessment mode.

The creation of an independent research centre, the Ceibal Foundation Studies Centre, in 2015, is another example of the new steps taken towards learning and technology mediation inside and outside the formal education system. The generation and promotion of independent research and excellence will be a unique opportunity for analysis, discussion and knowledge transfer that will help support decision-making by the various stakeholders in the education system as well as understand the use of digital technologies in training and promotion of better opportunities.

The Ceibal Foundation has defined priority research areas for projects and agreements, namely:

- Social use of ICTs and digital culture – use practices and knowledge generation; literacy, digital fluency and maturity; individuals, citizenship and digital identity; communities and social networks; changes in schooling culture.
- Resources and platforms – Production and appropriation of educational resources; accessibility, usability and inclusion; mobile devices and bring your own device (BYOD); do it yourself (DIY) technologies.
- New ways of knowing, learning, teaching and assessing – new pedagogies and technologies; cognition and meta-cognition; new syllabus approaches; multiple learning

- environments; formal, informal, and non-formal learning; self-learning and personalization.
- Extended learning achievements – performance and efficiency; evaluation of achievements in both formal and informal learning; effects on school learning; new headings, metrics and indicators.
- Teachers in the digital age – basic training and use of technology; innovation in teacher professionalization; the teacher as a knowledge worker: motivation and recognition; teacher profiles in the 21st century; new ways to boost performance.

The Foundation has engaged in training and discussion efforts, and has funded research projects under agreements with various national and international bodies. For example, in 2015, the Ceibal Foundation Studies Centre financed, together with the National Agency for Research and Innovation (ANII, by its acronym in Spanish) 12 research projects aimed at providing original data on social and/or educational aspects of the Ceibal Plan in line with the research areas of the Foundation.

Agreements with universities, educational foundations, technology industries, and foreign governments are also part of the plans the Foundation has to achieve national and regional recognition as well as internationalization of the research carried out under the Ceibal Plan.

The evaluation culture has evolved and improved as the Ceibal Plan has evolved. On the one hand, there are evaluations to determine the effectiveness of technology use, the use of "Ceibalitas" (laptops), and the educational platforms and infrastructure implemented. On the other hand, there are evaluations linked to the degree of performance of students whose education has been supported by various learning technologies.

For six years now, and upon request from the Public Education National Agency (ANEP), the Ceibal Plan has worked with the Learning Evaluation System (SEA), an online evaluation system for Math, Language, and Sciences. SEA is designed to provide teachers with a complementary view of the evaluations they perform on a daily basis in their classrooms and to help them reflect upon learning and teaching. In collaboration with teachers, specialists in the subject matter and inspectors designed items that evaluate the most important information in each of the subjects mentioned above. Some learning assessments are conducted at the end of the school year in order to evaluate students' achievements, while other learning assessments are conducted during the school year in order to improve teaching. Students access the SEA platform and complete the exercises. At the end, the teacher can display the results in a matrix that allows a double analysis, per student and per activity.

Implementation procedure:

Divide the class into a few small groups. Ask each group to analyse the case study and outline the main activities and methods used to improve technological learning in Uruguay. Suggest students to think whether and how this strategy could be applied to your local context to improve technological learning.

Let students work in small groups for about 30-40 minutes. Give them sheets of paper to write down the major points of the strategy they would suggest applying in the local context.

Suggest students discussing their ideas within their group. Visit each group and observe the results of work and discussion. Provoke critical thinking by asking questions about the strategy that students suggest transferring to the local context.

Timing:

About one hour is needed to implement this learning activity.

Lecture.8 Innovations exploitation and management

Learning outcomes:

After engaging with the learning material in this lecture, students should be able to characterize the concept of "innovation exploitation" and to differentiate it from the concept of "innovation exploration". They should also get familiar with the EASTECO Strategic Plan 2017/18 – 2021/22 and be able to relate its priorities to the developmental challenges faced by East African countries (Kenya, Tanzania and Uganda). The learning material of this lecture should also allow students to understand the importance of management innovation for exploration and exploitation of S&T innovations.

Workload:

3 academic hours (2 hours in-class and 1 hour independent learning).

Learning activity 8

Objective:

Reflect on innovative ideas and plan their potential implementation by describing the key elements (content) of the conception, exploration and exploitation steps of the innovation process.

Task:

Working in small groups (as you did in Learning activity 7), reflect on the proposal for improving technological learning in your local context developed by one of the other groups. Formulate key elements of the three distinctive steps – *conception, exploration and exploitation* – that should be taken in order to turn these innovative proposals into valuable economic and/or social results.

Implementation procedure:

Divide the class into a few small groups (as many as you did for the previous assignment in Lecture 7). Randomly redistribute the proposals developed in Learning activity 7 among the groups. Ask each group to describe the three steps of the innovation process, as suggested in the task. Then, ask each group to present the result of their work to the whole class. Facilitate the discussion.

Timing:

30 minutes may be needed for group work and 30 minutes – for presentations and discussion. The time needed may differ depending on the size of the group.

VI. Readings and resources

Lecture.1 National, regional, sectoral and technological innovation system

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Lecture.2 Innovation processes and structures

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2. Creative Leadership Mentor, Nelson Cabral, case studies. Available at: https://www.nelsoncabral.ca/case-studies/
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Lecture. 4 Types of innovation

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Lecture.7 Technological learning, technological catch-up, technological leapfrogging

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Erasmus+ Programme

Capacity Building in Higher Education

African Higher Education Leadership in Advancing
Inclusive Innovation for Development / AHEAD

AHEAD
Inclusive Innovation
for Development

www.ahead-project.net