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Train the Trainers -
Planning classroom Workshops aided by experiments and computer simulations

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Objectives of this presentation

- To define the terms classroom experiment, virtual laboratories, interactive learning and classroom workshop

- Present engagement strategies in a classroom

- Present basic steps in designing a classroom workshop

- Present the role of teacher as facilitator

- Present a classroom workshop template for teachers

- Present agile education as an alternative approach

Classroom experiments

What are classroom experiments

❑ Classroom experiments are carefully designed and guided activities undertaken by students, usually in groups.

❑ Students through observation and/or actions collect data, obtain knowledge, and gain deeper understanding on various subject maters examined in experiments.

❑ A well-designed experiment targets common student misconceptions, focusing on major ideas that students will need to understand correctly in order to support deep learning.

❑ In classroom experiments, instructor (teacher) it is critical to act most as facilitator by asking leading questions and drawing attention to interesting results.

What to consider when designing classroom experiments

❑ The basic requirement for a successful classroom experiment is to make sure that the experience gained form it matches to course content that students are trying to understand.

   ❑ If this requirement is not meet the experiment may confuse students and will not help them to achieve course goals.

❑ DO NOT design an experiments just to make something happened as in such cases students are usually just viewers and do not get the experience.

❑ Design an experiment where students can make decisions, watch what happens and "feel" the experience from it.

Steps to design classroom experiments

❑ Identify the topic you want o illustrate and relative learning objectives.

❑ Design an environment where students can make decisions through the experiment.

❑ Think about variations on your decisions about the experiment you can try in the class.

❑ Think how you will communicate with students and collect their decisions

❑ Use materials that are easy to obtain.

❑ Prepare some instructions for the students about the experiment e.g.: a series of steps they need to follow.

❑ Prepare a post experiment assessment that will help you to assess the learning objectives were achieved.

Virtual laboratories

What is a virtual laboratory?

❑ A **virtual laboratory** is a computer-based activity in which students use a computer interface to explore and/or interact with a scientific subjects, instruments, scenarios, systems etc.

❑ Learners can practice in a safe, online environment with virtual laboratories by using virtual scientific lab games and simulation software.

How to use virtual laboratories /1

❑ Virtual laboratories encourages interactivity and experimentation between learners and educator leading to better learning experience and deeper understanding in a subject.

❑ Some good practices are:

  ❑ Learners should be encouraged to explore and discover rather than memorizing concepts and procedures. For example, the educator poses a situational question and then learners can explore its aspects to virtual lab.

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How to use virtual laboratories 2

❑ Learners should use computer simulations to improve their abilities by exploring increasingly complex processes as they master simpler ones.

❑ Educators should provide projects that are suitable for this process. They can provide learners with lab-style projects that show them how to use a physical laboratory in a step-by-step manner. They can include safety precautions and advice on how to operate the item properly.

❑ Educators should provide, if possible, an interactive and rich interface that will provide a fluid and adaptable learning experience

Barriers in using virtual laboratories

❑ Using virtual labs can lead to several pitfalls in case:

   ❑ Learners do not have the required general skills to participate and feel uncomfortable with the environment

   ❑ Educators are not properly prepared for this educational approach.

   ❑ It must be considered the time, effort and money needed to prepare the appropriate material

   ❑ <u>Lectures on specific topic is necessary before implemented a virtual laboratory</u>.

      ❑ The mix of theoretical lectures and hand on / simulations activities gives the best results.

Interactive learning for student engagement

❑ Top priority for every teacher is to keep its students engaged. By that way students become a part of the lesson and are not passive observers.

❑ A mean to achieve that is **interactive learning**. Students can be engaged to interactive learning in 3 main ways:

- ❑ **Engage with the subject.** Students should have the chance to actively explore or apply what they learn in a practical way. Computer Simulations can be very helpful on this.

- ❑ **Engage with each other.** Students can have structured conversations, interactions and collaboration through the learning day.

- ❑ **Engage with the teacher.** Students can discuss with their teachers their questions, thoughts and experiences as they learn or apply concepts.

Engagement strategies

❑ As student engagement is not something can occur by itself or spontaneously. A teacher should apply specific and effective approaches in his classroom to achieve students' engagement.

❑ Such approach is **classroom workshops**. With classroom workshops a teacher can achieve students' engagement in all three ways mentioned previously.

❑ This method has its roots in classical workshops model.

What is a workshop?

- ❑ A **workshop** is a structured interactive meeting or educational sessions in which a group of people goes through a series of activities to create a specialized result.

  - ❑ Workshops require a lot of preparation beforehand.

  - ❑ Workshops emphasize on hands-on interaction.

  - ❑ People can meet to identify problems, discuss questions, brainstorm ideas, develop solutions and make decisions.

- ❑ Under that prism, a **classroom workshop** is one or a series of structured learning experiences to engage students in hands-on or simulation activities and help them to gain deeper understanding to the subject.

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Why workshop approach?

- A workshop approach is suitable, among others, for:

    - Demonstrating new concepts.

    - Explanation of something to the public.

- It is compatible with learning approach based on virtual laboratories

Designing a classromm workshop

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Basic principls in workshop designing

1. **Participants should be actively engaged in learning process**. Encourage and give participants time to interact and share thoughts, experience/knowledge, questions.

2. **Plan in details all workshop phases**. Don't let spontaneity take over and take you out of context.

3. **Workshop activities stems from workshop goals**. Consider what do you want to achieve and what you want participants need to know or do at the end of the workshop.

4. **Use existing resources** and do not re-invent the wheel.

Classroom workshop phases /1

1. **Opening.** The aim of this phase is to engaged students by connecting to previously learned concepts to our new objective for the day

2. **Mini-lectures.** The aim of this phase is to deliver theory, talk about the background of the activity or finalize the results of the activities. Also, students' questions, knowledge, perception on the subject can be discussed. Teacher can keep notes on whiteboard. In that way, can be identified by the teacher the concepts that each student needs.

   ❑ Remember that this phase should be kept short in order to not loose target.

Classroom workshop phases /2

3. **Work-time/practical exercises**. At this phase students working either on groups or individually can perform various hand on activities or simulations. The use of computer simulation is a good approach on this phase.

4. **Reflecting**. At this phase students can talk about their experiences from previous phase, highlight what they learned, what impressed them, how they felt about the process, problems the meet etc.

    ▪ Phases 2, 3 and 4 can be applied in an iterative and incremental way.

5. **Debrief/share**. At this phase the teacher sums up the activities took please, lessons learn, challenges that occurred, factual information and possibly next steps.

    ▪ Important notes of this process should be documented and shared with the students.

Things to consider when designing a workshop /1

❑ **Learn your group**. Be sure that you know your target audience. This includes not only knowing their knowledge level and the level of competences you required they have but also what they expect to learn.

    ❑ In case of a student class this is not difficult to be achieved but should not considered as trivial in order to avoid pitfalls.

❑ **Formulate the goals that you want to achieve**. These goals should be realistic and attract the interest of the participants. Setting a goal in to general form is not good practice. You need to set specific and tangible objectives towards that goal

    ❑ E.g., "*I want to increase awareness about CO2 emissions*". Is that enough?

Things to consider when designing a workshop /2

❑ It would probably be much better to set the following objectives towards that goal

✓ *Present the carbon cycle.*

✓ *Explain the mechanism that CO2 emissions contribute to global heating*

✓ *Examine how fossil fuels contribute to the process*

✓ *Examine the role of renewable energy sources*

✓ *Understand the dynamic of the phenomenon for the next 100 years.*

✓ *e.t.c.*

Things to consider when designing a workshop /3

❑ **Schedule it.** Prepare a schedule for the workshop and specify activities' time frames

   ❑ **Plan breaks** if it takes a lot of time. This will help students to refresh, keep their attention and energy. E.g. 10 min break for a 60 min session, 15 min for 90 min session.

❑ **Keep balance between your activities**. When designing the workshop, consider:

   ❑ balancing it with different teaching formats and activities.

   ❑ Include and order the various activities to keep students' attention and help them stay focused..

Things to consider when designing a workshop /4

❑ **Prepare all the material you will need** for the activities.

❑ **Consider the appropriateness of the place** that will conduct the meeting and its compatibility with planned activities.

The facilitator

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The role of facilitator

- ❏ As we have already noticed, the teacher should act as facilitator.

- ❏ A facilitator plans, guides, manage discussions, help bring ideas from all participants and conclude the outcomes at the end.

- ❏ A key point to facilitate a workshop well is to understand the background and the context of the event and participants expectations. Doing that you can structure the event and select best tools to achieve event goals.

Steps for effective facilitation /1

❑ **Plan event structure**. Do not forget to give participants time to raise their points on the topic.

❑ **Create an agenda**. Define the order you will present the topics, how communicate the objectives to students, when you will recap and summarize.

❑ **Consider logistics**. What materials you will need, make room arrangements if needed, consider if room structure is suitable for the event, do you need any special equipment, do you need to consider safety precaution etc.

Steps for effective facilitation /2

❑ **Guide and control the event.** Set the ground rules, set the scene, monitor participants and make sure everyone remain focused and interested, listen actively etc.

❑ **Record event results and share**.

❑ **Reflect and improve**. When event finishes, reflect on your own performance, evaluate and consider what can be improved next time.

A workshop schedule template

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A workshop schedule template /1

STEP #1. Opening - Introduction - What is ……………? (10')

a. Opening & Introduction: Welcome the participants, introduce the facilitators if any, session outline and give a general overview of the session aim and objectives. (2')

b. What is ……………....?: Ask participants to brainstorm and answer individually the a warm up question: *"What* …………………………………...., in 1 word. (1')

c. Collect the answers either using a word-cloud application or writing them down a on a whiteboard. (2')

d. Discuss briefly the terms and use them to introduce to the definition/aspects of the "……{theme}……………………" using poster/photos/slides or anything other you think appropriate. (5')

TIPS

✓ If you plan on using an app to create a common word-cloud, ask participants to install it and sign up in advance, or collect the words beforehand as a preparation task and create it yourself.

✓ Show a characteristic photo/poster/ article on the subject to obtain unbiased responses.

✓ Resources: *Provide a resource e.g. A web page.*

TWEAKS

★ If time allows, add a quick round of presentations. It may be general, for the whole audience (+5'), or within each group (+2').

STEP #2. Mini – lectures (10')

a. Present some background theory of the subject using short presentations.

b. Ask students to reflect on the presented theme and their prior knowledge/actions/attitudes or anything that suits the case by setting suitable questions. questions: e.g. *"Which………? / How do you …….…. in your daily life?" etc.,* (3')

c. Once the reflection is finished, you can ask them to write something they consider important / an expectation /belief /catchword etc. they have relative to theme and the following activity in a sticky note and maybe put them in a board.

d. Share them in silent exhibition. (2')

TIPS

✓ Prepare and distribute small yellow sticky notes and markers.

✓ Invite participants to approach the board to stick the notes.

TWEAKS

★ If time allows, invite participants to introduce each other and share their thoughts while sticking the notes on the posters. (+3')

STEP #3. <u>Work-time</u>/practical exercises (10-25')

a. Ask <u>students to</u> implement the experiment or explore simulation explore simulation according to guidelines you had provided, collaborate and take decisions, explore variations or alternate scenarios or whatever is suitable or appropriate and record results.

TIPS

✓ Keep attention <u>so</u> that participants do not get off topic and provide support.

✓ Students can work individually, in pairs, or in groups, to use the information taught by the teacher to complete a specific task.

TWEAKS

★ if applicable or there is time ask students to write a note as in previous stage but under the experience or insights, they gain form the practical exercise.

STEP #5. Debrief, Share & Closing Remarks (15')

a. Ask each groups/table to conclude and share their idea/ thoughts about the activities (mini-lessons and practical exercise in plenary (90" per group 30" per individual - depending on number of ideas). (10')

b. For evaluation, give them the evaluation form/tool you have prepared (2')

c. Close the session by summarizing the activities took place, lessons learned, on the contributions and follow-up information on how to engage further and possible next steps. (3')

TIPS
✓ Total presentation time should not go over 10 minutes.
✓ You can provide further resource for study on the topic.

TWEAKS
★ Each group can share their favourite idea back to the audience with the visual aid of their mind maps.
★ At evaluation, if equipment is available, you can use a word-cloud application to collect the answers and display the results on the screen.

Agile learning approach

❑ Agile learning approach is an adoption of Agile methodologies applied in project management in education environment. Main agile educational frameworks are EduScrum, Agile@school etc.

❑ Agile methodologies follow an iterative approach to project management and to product development in general, that helps teams deliver value to their customers faster and with fewer problems.

❑ Instead of implementing everything on a monolithic way, an agile team delivers work in small, but consumable, increments.

❑ Requirements, plans, and results are evaluated continuously so teams should have a mechanism for responding to change quickly.

Agile learning facts

❑ An agile learning environment is an environment that is highly responsive, adaptive and iterative.

❑ In Agile learning environments participants gain or improve their competences through the work undertaken.

❑ Agile learning is based on incremental design approach where learning occurs through doing, trying and fail.

❑ Agile learning moves in small steps and via an iterative process. That means continuously testing, refining and improving content until you're pleased with the final result

❑ Agile learning is focused on flexibility, collaboration and speed.

Agile (Scrum) artifacts

❑ **Product Backlog (PB)** is a list that collects everything the product needs to satisfy the potential customers. Task prioritization is based on what is more and less important for the business.

❑ **Sprint Backlog (SB)** is a subset of items of the product backlog, which are selected by the team to perform during the sprint on which they are going to work

Agile ceremonies

❑ **Agile ceremonies** are meetings with defined length, frequency and goals.

   ❑ Their aim to help project team members to plan the work need to be done, track and evaluate current project progress, engage team members to project and help them to reflect on how well or not the work has been done during the previous stage.

   ❑ The **Sprint** is the basic unit/event of work for a Scrum team and four ceremonies are organized during this unit. They are the following:

   ❑ Sprint Planning
   ❑ Daily Scrum
   ❑ Sprint review
   ❑ Sprint Retrospective

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Agile process – Scrum model
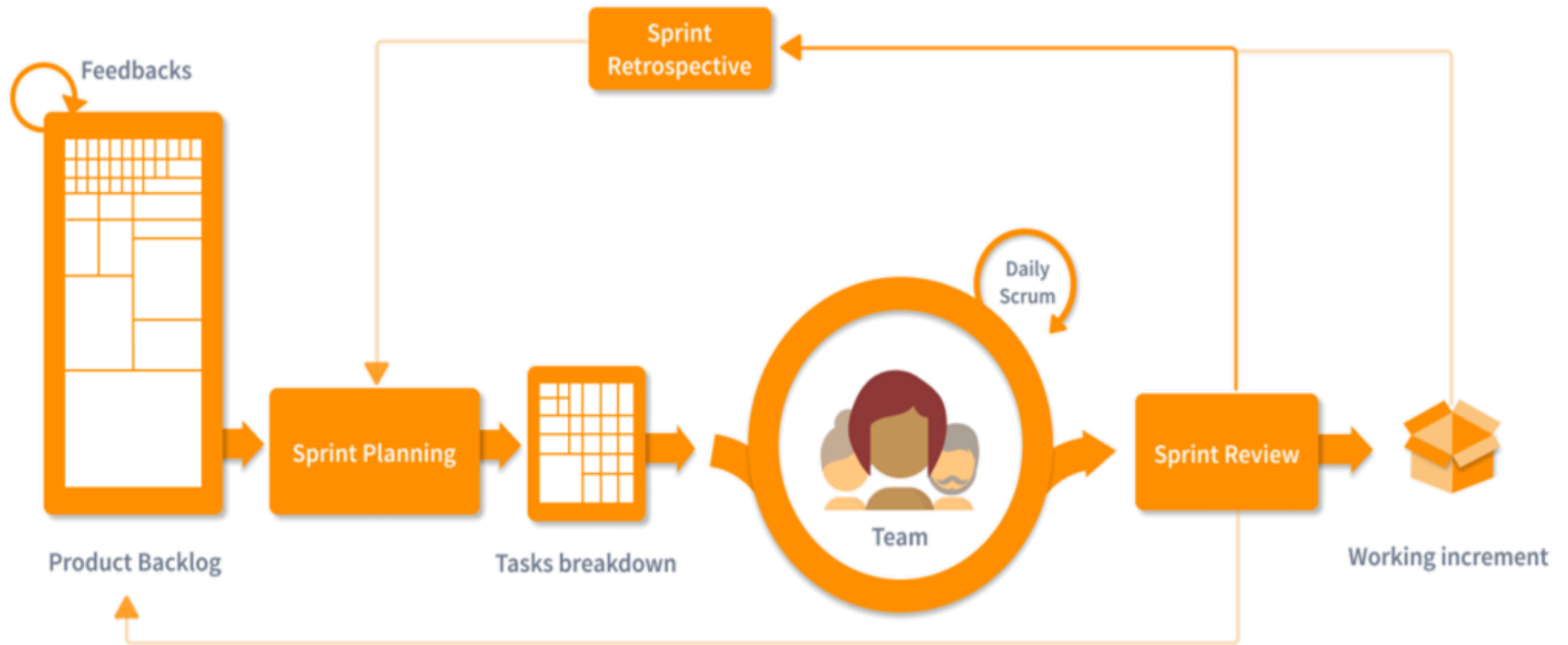
How to apply /1

❑ Divide students into small groups 4-5 persons.

  ❑ Do not encourage group forming based on friendships but on skills and competences

  ❑ Always change groups when starting new project.

❑ Present to students the topic and set the framework. E.g., work timeframes, assessment criteria etc.

❑ In collaboration with students create a list of things that students should do, learn or create during the event. This is called product backlog.

❑ Select a subset of product backlog that will be developed during first sprint

How to apply /2

❑ At the end of sprint, let students:

  ❑ present what they have done,

  ❑ reflect on the process they follows

❑ Select another subset of product backlog and begin the next sprint.

❑ Repeat the process until all backlog list requirements are implemented.

❑ At the end reflect on whole process, identify good or bad practice, identify what students learn beyond typical knowledge but in terms of skills and competences.

More…

❑ You can find more on how to apply Agile approach in education here:

   ❑ https://agile2learn.eu/

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Thank you for your attention