EARLY

DISTANCE LEARNING MODEL
REINFORCED WITH ROBOTICS FOR
3-7 YEARS OLD CHILDREN

LESSON PLANS
FROM THE
HIGHER EDUCATION COURSE CURRICULUM

Funded by the European Union

Lesson Plans from the Higher Education Course Curriculum for a Distance Learning Model Reinforced with Robotics for 3 to 7 Years Old Children

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ISBN

978-989-35325-2-2

DOI

10.34633/978-989-35325-2-2

PUBLICATION DATE

2023

PUBLISHER

Escola Superior de Educação de Viseu, Instituto Politécnico de Viseu

Rua Maximiano Aragão, 3504-501 Viseu, Portugal

PUBLICATION SITE

Viseu, Portugal

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The project **Distance Learning Model Reinforced with Robotics for 3-7 Years Old Children** – 2021-1-TR01-KA220-HED-000027617 is co-financed by the Erasmus+ programme for education, training, youth and sport. The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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MODULE 1

Basic Concepts of Computational Thinking

EARLY

MODULE 1 – SESSION 1

The Concepts and Dimensions of Computational Thinking

LESSON PLAN

Learning gains

Define what it means to think computationally.

Recognise the basic concepts of computational thinking.

Develop class activities for children by integrating computational thinking-oriented activities with play-based activities.

Analyse each other's class activities to assess if they are suitable for fostering computational thinking.

Classify the dimensions of computational thinking.

Relate the dimensions of computational thinking to real-life situations.

Develop class activities for children by integrating computational thinking-oriented activities with play-based activities.

Time

2 hours

Methods and techniques

Activity-based teaching method

Peer collaboration, station, cornering

Discussion techniques: (think, pair, share)

Workshops (In groups of 3, 4, or 5)

Group and individual work: Worksheets / Drawings / Puzzles / Charts / Compositions

Resources, tools, and equipment

Texts, Videos, Games, Worksheets, Crayons, Mobile Phones, Modelling Clay

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LESSON PLAN

PREREQUISITES (KNOWLEDGE, SKILLS, ETC.)

For 3rd or 4th grade undergraduate preservice teachers with prior knowledge about early education.

NEXT TOPIC/LESSON

Module 1 – Session 2: What is a Loop

IMPLEMENTATION OF THE LESSON

INTRODUCTION

GAINING ATTENTION

Start the lesson with a question:
"Which is more important, teaching children what to think or how to think?"

Elicit the answers, in this way, you will attract their attention, make them ready for the subject matter, and have an opinion of what your students think.

MOTIVATION

Ask students how they wash their hands, step by step. Elicit the answers.

Ask them what happens if they don't turn on the faucet to rinse their hands with water. What happens if they change the order of the steps?

Elicit the answers.

Tell them that they should follow a sequence to wash their hands as discussed. The sequence is one of the concepts of computational thinking and without it, it is impossible to fulfil many daily life activities.

Computational thinking is the process of thinking through a problem step by step in a measured and logical manner (Smith, 2021). So, thinking systematically to solve a problem like a computer will facilitate many solution processes in both work and daily life as well as computation activities.

Tell students that they will learn about the concepts of computational thinking in this lesson, why it is important and why they need to teach it to children starting from the early years.

Ask them if they have heard about it before and elicit the answers.

STATEMENT OF THE LEARNING GAINS

Tell students that they will learn about the concepts of computational thinking and then work on how they can teach them to preschool children through play-based activities and also by awakening them to smarter ways of thinking.

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DEVELOPMENT

IMPLEMENTATION OF THE LESSON CORE

Use slides presentation to introduce your students to computational thinking concepts during the lesson.

Use Worksheet 1 to allow your students to study the concept of “sequence”.

Let them discuss if their sequences are correctly written. Challenge them to change the order of some steps and let them decide on the critical steps and changeable steps. Ask them to discuss the importance of creating their own steps and finding the best ways to complete a task.

Use Worksheet 2 to allow your students to study the concept of “loop”. Let them present their song and dance actions. Let them choose good performances and comment on how to improve the others.

Use Worksheet 3 to allow your students to study the concept of “conditionals”. They will colour the mandala according to the conditional statements true or false for them. Let them discuss the question on the worksheet.

Note: Worksheet 4 will allow students to study the concept of “data”. However, this worksheet can be used after the lesson. After the class, students can meet online and collect data. Then they can share their findings with each other.

Give information about modularity and how it can facilitate us to break down a problem into smaller units. Divide students into 4-5 groups. Give each group ten slices of bread, a jar of peanut butter (or honey, or cream cheese) and a knife. Tell them they need to prepare ten slices of bread with this spread by developing their own way to do this. Then, let them do the task. Finally, ask them to explain how they managed the process.

Additional activity: You can develop another different complex task for students and let them modularize the task.

Additional activity: Students can show the breakdown process on a diagram at https://www.diagrameditor.com (a free version is available)

(Do these additional activities if you have enough time.)

To reinforce the concept of the “hardware/software”, let students go to https://miro.com/concept-map (a free version is available) in groups of 3-4. Ask them which elements are necessary for a computer. Elicit the answers. Let each group create a concept map including the elements of a computer. Then, provide the list of these elements on the PPT and revise their answers and determine which group knows most about the elements of a computer.

This activity can be done with paper and pencil as well if an online connection is not possible.

Use Worksheet 5 to revise debugging. Let them show how they have determined the mistakes in the codes and discuss the new codes they create. If new mistakes emerge in the new codes, let other students debug them. (You can use a bigger grid for more complex codes.)

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Talk about the design process as the final concept of computational thinking for early education. Discuss with them the elements of a design process such as imagination, planning, and creation. Bring some modelling clay or Lego pieces to the classroom and ask students to design something new (e.g., a chair that will protect users from direct sunlight and can be used on the beach or in the garden).

Note: This should be a quick process, so you can give them more examples to work on.

At the end of the design process, ask students if they used their imagination to design their objects if they planned their components or construction processes; or if they tried to create them with modelling clay or Lego pieces. Let them discuss, in early education, how they can teach the design process.

In the second hour of the lesson, use slides presentation to introduce your students to skill dimensions of computational thinking during the lesson.

Show the algorithm for finding a job on the screen. Or print the flowchart and copy it as a hand-out (Module 1 – Session 1 – Figure 2 – Algorithm flowchart). Allow students to discuss which concepts they can see in the flowchart.

Ask them to create their own algorithms for a process such as ironing a cloth, brushing teeth, doing laundry, teaching the colour red, making tea, travelling abroad, etc.

After revising the skill dimension of “evaluation” together, ask students to prepare a simple poster displaying the importance of algorithms in daily life. Students will evaluate each poster as a class.

Ask students to give examples of what they generalise in daily life after revising the skill dimension of “generalisation”.

Ask students to open their mobile phones and an online map (navigation) application. Ask them to determine two city locations on the map and ask the application to find a route from one point to the other. Explain that the navigations are one of the best examples of abstraction. The programme can specify the route necessary for you by abstracting it from the road in the city. It can also find different routes according to different features such as economic, fast, or easy.

Ask students to think about different abstraction examples in daily life. Let them explain their examples.

Use Worksheet 6 for the final skill dimension (decomposition). Let students do the activity and share their work with their classmates.

Ask them to develop a learning activity (or a lesson plan) explaining how to teach design thinking to children.

Conclusion

Summarizing

Give one example for each concept and dimension and ask students to match the correct concept and dimension to each example you mention. Expand your exercise with more

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examples if you have time. In this way, you will see to what extent they could digest the lesson content.

Use interactive presentations (Module 1) developed in a previous Erasmus+ project ALGOLITTLE.

Revise the algorithmic thinking skills (sequences, loops, conditionals) with students.

https://www.algolittle.org/presentations/

Use the video (Module 2 – Session 4) prepared in a previous Erasmus+ project MINDMATHS. Revise the dimensions of computational thinking.

https://www.mindmaths.org/video-category/module-2/

Homework

Two assignments proposed for the concepts of computational thinking:

1- Find your own examples for each concept.

present them in the class with a poster or a song

2- Plan how you would teach one of the concepts to children through in-class & distance education

Present them in the classroom by applying your learning activities (maybe in groups)

If in-class activities are possible, students can present their homework in the lesson. Otherwise, you can schedule an extra lesson for this, or only written homework will be submitted.

One assignment proposed for the skill dimensions of computational thinking:
1- Plan how you would teach each dimension to children, present them in the classroom by explaining your learning activities (maybe in groups)

If in-class activities are possible, students can present their homework in the lesson. Otherwise, you can schedule an extra lesson for this, or only written homework will be submitted.

Re-motivating (What will it do in real life?)

As we see, all computational thinking skills are the creation of human cognition, and we use them in our daily lives unwittingly. In-perspective use of these cognitive skills will facilitate daily life activities while helping us notice our mistakes more easily and see smarter ways of doing things. Besides, the awareness of computational thinking concepts will enable the programming education process at future education levels.

Assessment / Evaluation or testing

Students will do the self-assessment on Module 1 – Assessment Form

End

End the lesson and say goodbye to the students.

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WORKSHEET 1

Make an algorithm

It is a straight sequence that is the order of the steps of a process.

Select a process and sequence the steps of the process

1. Making a cake, **2.** Folding a cloth, **3.** Writing an essay, **4.** Brushing teeth, **5.** Going to school, **6.** Drawing a rectangle, **7.** Playing hopscotch

Good Practice	Challenges

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WORKSHEET 2

Make an algorithm

It is a loop that is the same steps iterated over a sequence.

Plan a dance routine for the children

First, select a fun song. Decide 3 different actions for the dance and determine how many times each action will be repeated. The number of repetitions may vary according to the song you select. Why do you think we call this activity loop in a loop?

Good Practice	Challenges

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WORKSHEET 3

Make a decision

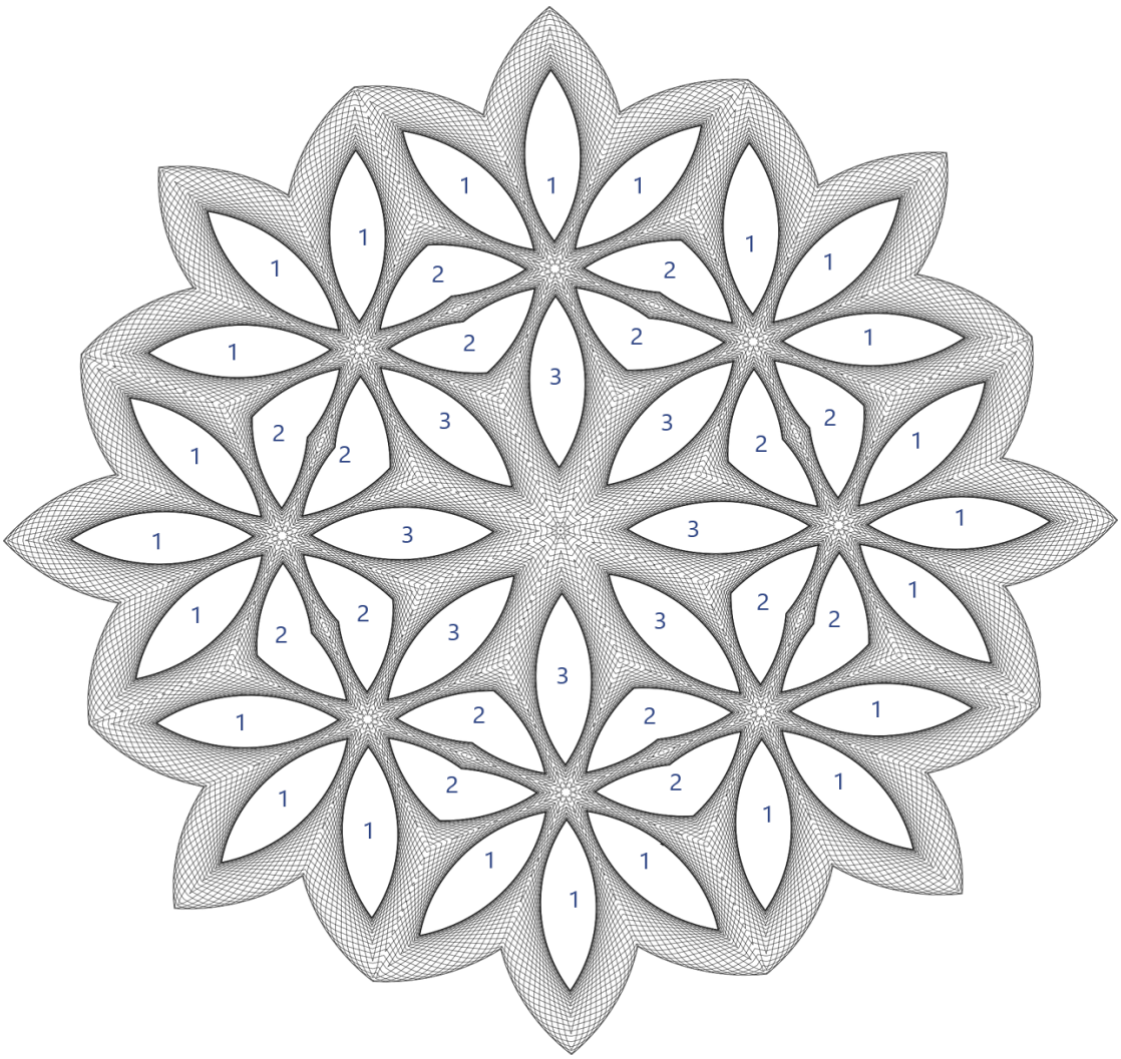
Computers make decisions based on the pre-stated conditions that are true or false.

Colour your mandala according to your answers to the conditional statements below.

a. If you like warm colours, then use the colour code below to colour the mandala.
1: Red, 2: Orange, 3: Yellow

b. If you *don't* like warm colours, then use the colour code below to colour the mandala.
1: Blue, 2: Green, 3: Purple

Discuss with your friends what you should do if you like all colours.



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WORKSHEET 3

Challenges

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WORKSHEET 4

Use data

The pieces of information form include facts, concepts, or tasks in order to interpret them easily.

Ask one of the questions below to 10 students in your classroom

Ask one of the questions below to 10 students in your classroom and note the answers (as your data) in the table. Then, calculate the percentages (findings) and present them to the class. (You can prepare your own questions to collect your data!)

Questions:

1. Where do you want to travel to the most?
2. What book has impacted you the most?
3. What are the top three things that make you happy?]

Data Table

Student name	Answer

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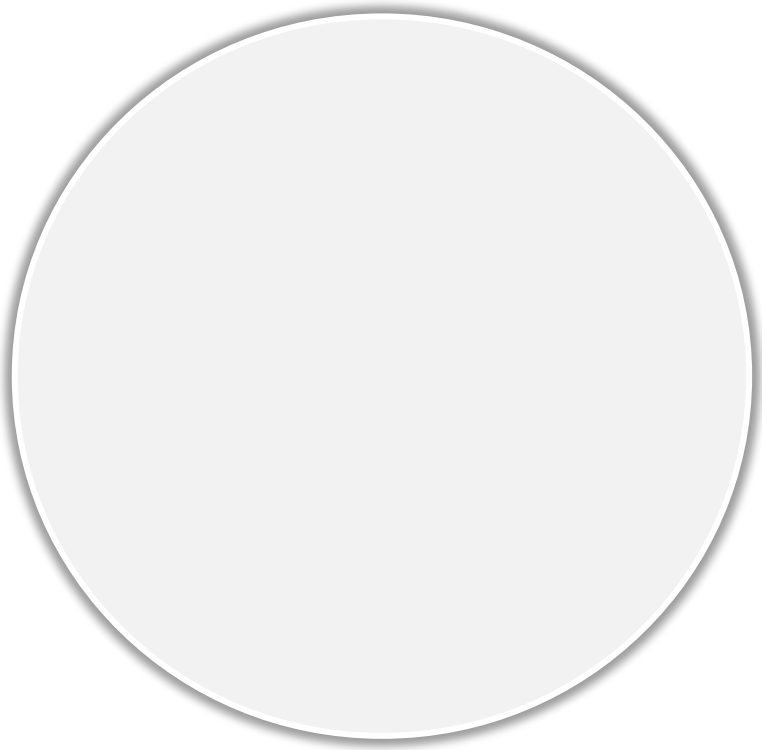
WORKSHEET 4

Percentages



Challenges

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WORKSHEET 5

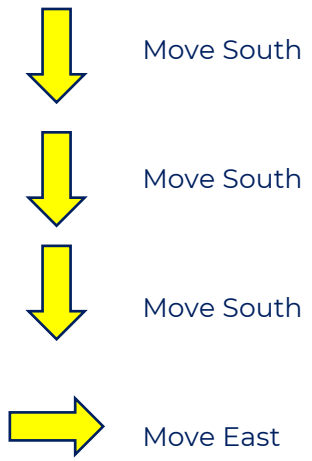
Debug

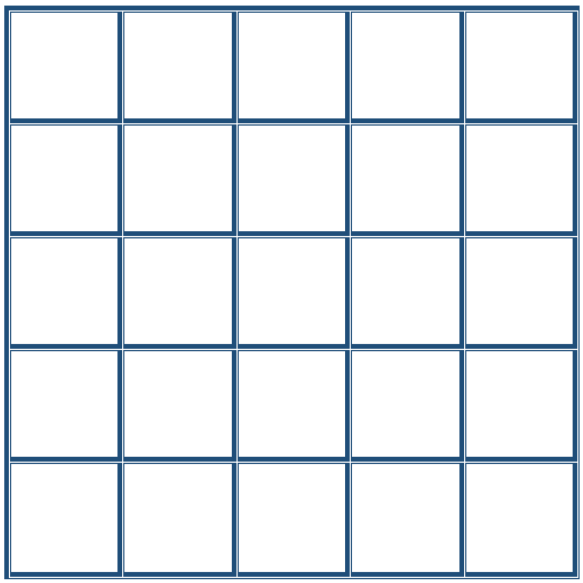
Debugging is to define problems and eliminate errors in an algorithm.

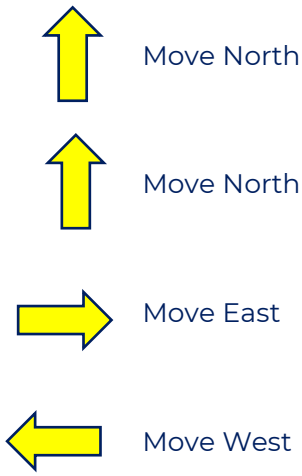
Find the mistake in each code.

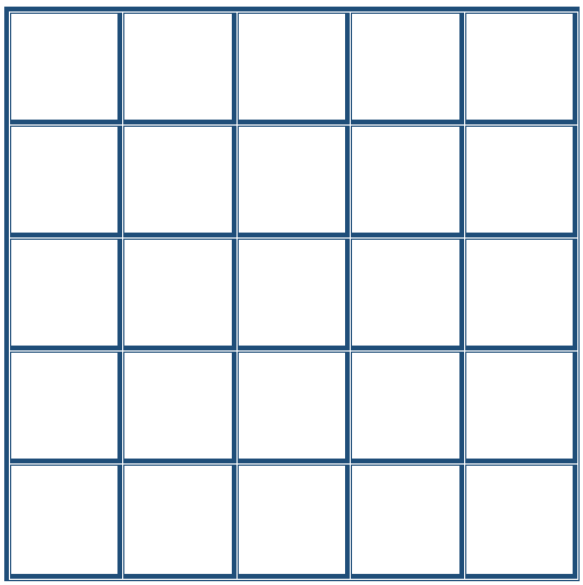
Green dot: Starting Point – Red Dot: Ending Point)

Then, create your own code for each route. (You can try a different path.)









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WORKSHEET 5

Challenges

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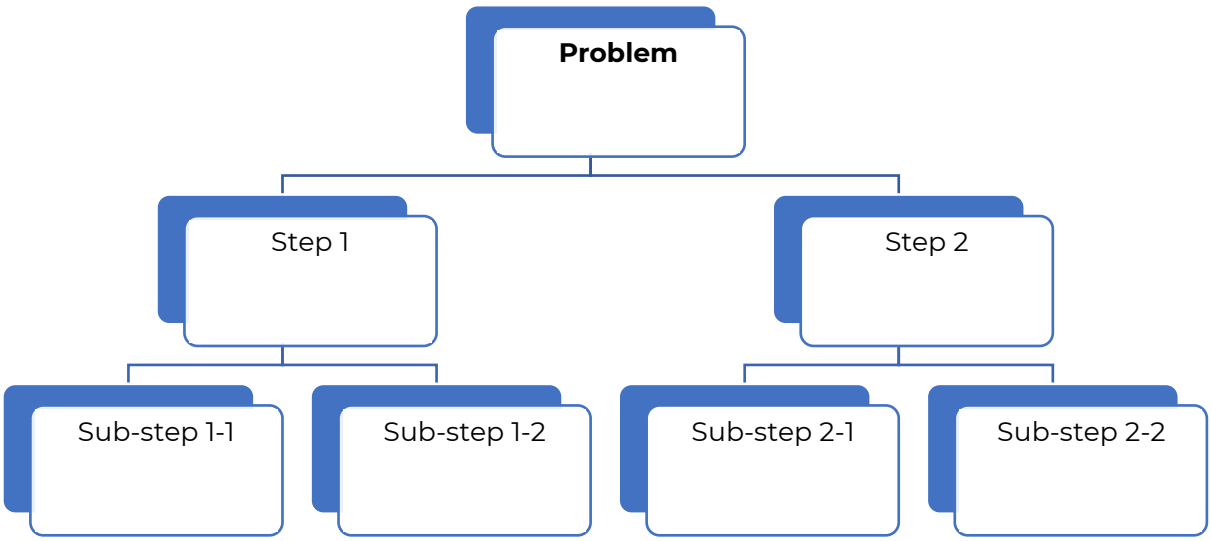
WORKSHEET 6

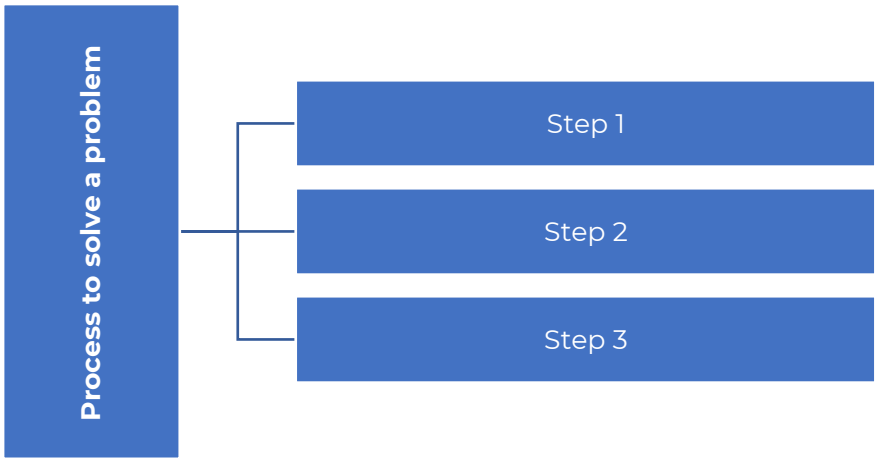
Decomposition.

It is the ability to break down a complex problem or structure into smaller pieces.

Revise the decomposition charts below

Think about a complex problem or a process. Break it down into smaller steps. Write each step in the boxes you draw. Discuss with your colleagues if your steps are meaningful/feasible.





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WORKSHEET 6

Decompose Your Process	Challenges

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HANDOUT

The concepts of computational thinking

The concepts of computational thinking refer to the fundamental ideas and principles underlying the field of computational thinking.

Sequence

The sequence is the order in which the steps of a process are followed.

Figure 1 – Sequence

Examples of activities, including sequential steps:

- Making a cake
- Folding a cloth
- Writing an essay
- Brushing teeth
- Going to school
- Drawing a rectangle
- Playing hopscotch

To define the steps of these processes, you can use Worksheet 1.

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Loop

When the same step is iterated over a sequence, we call this sequence a “loop” or an “iteration”. In computer science, a loop is a sequence of instructions that are repeated continually until a specific condition is met.

Figure 2 – Loop

Examples of activities for loop:

- Hopping continuously when we dance
- Hammering repeatedly to drive a nail into the wall
- Putting a song on a repeat mode
- Rubbing hair repeatedly to rinse the shampoo with water
- Channel-zapping
- Washing plates
- Stopping at the same stations (subway, public bus)

To see what happens when there are loops in a loop, you can have a look at Worksheet 2

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Conditionals

Computers make decisions based on the pre-stated conditions and depending on whether they are true or false. They run only when certain criteria are met meaning whether they are true or false. A conditional statement includes «if», «else», or «else if» statements.

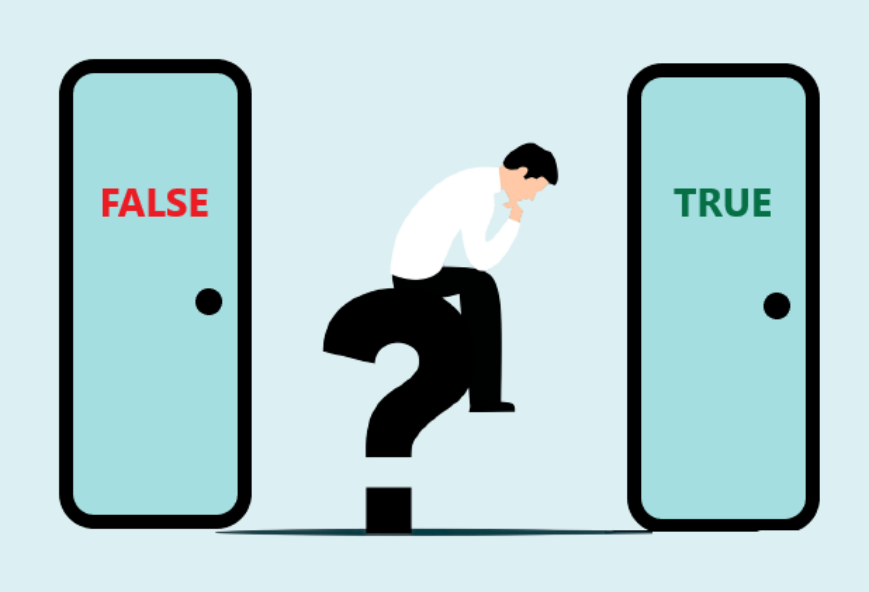

Figure 3 – Conditionals

Examples of conditionals:

- «If» statement
- If it rains, take your umbrella, (Yes, it rains)
- «Else» statement
- if it doesn't rain (else statement), don't take your umbrella. (No, it doesn't rain)
- «Else if» statement
- If it doesn't rain, then put on your sneakers. (No, it doesn't rain, so you do something else this time.)

See Worksheet 3 for more practice on conditionals.

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Data

The pieces of information form “data” that may include facts, concepts, or tasks in order, so we can interpret or process them easily.

The data we collect varies or changes depending on what we inquire about. For example, we can classify our meeting participants according to their interest areas to give them different gifts at the end of the meeting. Then the interest area will be our variable during the data collection process since it differs from person to person.

Figure 4 – Data

Examples of data:

- List of the animals that live in the garden
- The green pens in the classroom
- The ones who watched the Harry Potter film series
- The ones who have a positive attitude towards strict diet rules
- The ones who actively use social media
- The ones whose favourite interest area is sports

Optional Activity: Worksheet 4 for more practice on data.

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Modularity

Modularity is breaking down tasks or procedures into smaller, simpler, and more manageable units.

In modularity, we need to focus on the functionality of each unit of a whole on its own. Let's consider three electric sockets in a room. The washing machine, dishwasher and dryer can be plugged into these sockets separately and each socket enables the connected machine to work as their mechanisms are based on the same working principle.

Figure 5 – Modularity

Examples of Modularity:

- Workers' or robots' activities/tasks in the same unit of a factory
- Preparing serving dishes for invited people at a wedding ceremony
- A car (with removable pieces)
- A desktop computer (with removable and upgradable pieces)
- Prefabricated houses

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Hardware/Software

The hardware refers to a computational system's physical parts that need software or instructions to run. We, humans, have physical integrity thanks to our bodies (Hardware). The language we use for communication makes us human beings (Software). We use different means of communication such as verbal, non-verbal, written, or visual (Programmes/Applications).

The important thing here is to realise that computers and other smart devices do not work by magic. All computers, tablets and telephones are the products of human engineering and the main goal in early education should be enabling children to understand them.

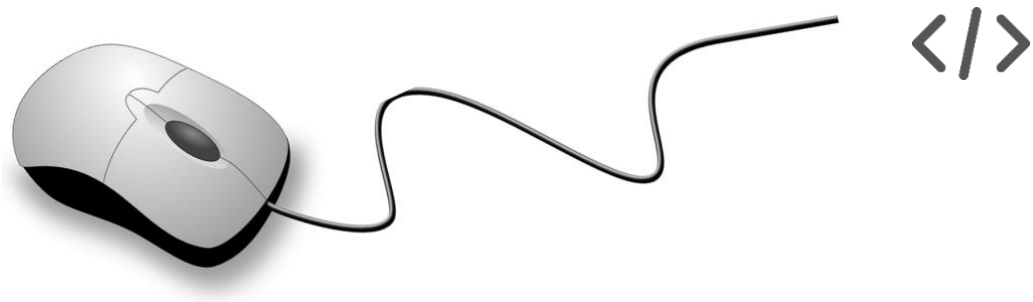

Figure 6 – Hardware/Software

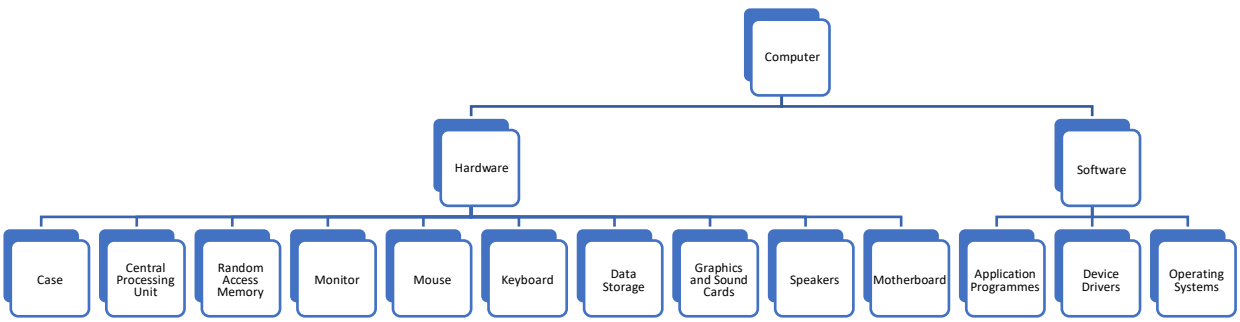

Diagram 1 – Hardware/Software

Debugging

Debugging is to define problems and eliminate errors to achieve a goal. In other words, debugging is the evaluation of the accuracy and appropriateness of the steps to a solution of a problem.

For example, an author debugs his writing after finishing it by revising it according to grammar rules, punctuation, or appropriateness for the target readers, and making the necessary corrections.

Figure 7 – Debugging

Examples of Debugging:

- Checking the battery or fuel level when the car does not start
- Checking text for grammar mistakes
- Checking mistakes in a recipe (e.g., instead of 1 cup of milk, written as 2 cups)

Please check Worksheet 5 for more practice.

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Design Process

The design process refers to handling and planning a design thoroughly. It is a series of steps engineers and designers use to develop solutions to problems. For example, authors use a series of process steps that they use to express themselves through written communication (books, thesis, etc.).

It is crucial to realise the creative processes including imagination, planning, creation, revision, and sharing. These processes are cyclical and iterated having no exact starting or ending points.

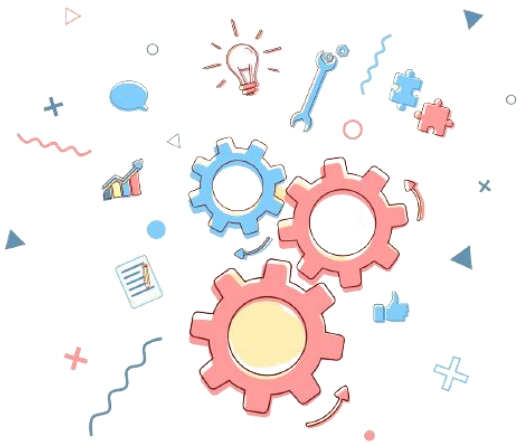

Figure 8 – Design Process

Examples of Design Process:

- Designing a comfortable chair for those who have backache (industrial design)
- Designing a course (educational design)
- Designing the rooms of a house (architectural work)
- Designing the work process in an organisation (Management)

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The skill dimensions of computational thinking

"The skill dimensions of computational thinking" refer to the specific skills or abilities that are associated with the practice of computational thinking. Computational thinking involves more than just understanding the concepts; it also requires the development and application of certain skills to effectively use computational thinking in problem-solving and decision-making processes.

Algorithmic Thinking

An algorithm is a series of steps to solve a problem or reach an objective. In an algorithm, each step should be defined as an exact instruction, so everyone can understand and follow. Building on that, algorithmic thinking is a pool of abilities that are connected to creating algorithms (Futschek, 2006).

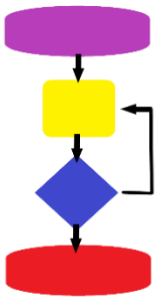

Figure 1 – Algorithmic Thinking

When you create an algorithm, pay attention to the following.

- to realise what the problem is (or what the goal is)
- to analyse the problem or situation
- to see the problem from different aspects
- to be aware of different steps that can help solve the problem (or reach the goal)
- to create the necessary steps to solve the problem (or reach the goal)
- to improve the algorithm according to different variables

Look at the algorithm for finding a job, which ones can you see?

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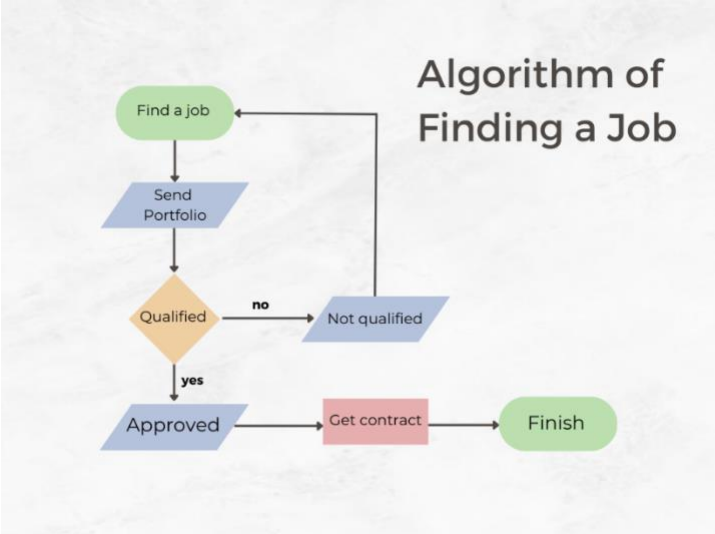
HANDOUT



Concept	✓	✗
Sequence		
Loop		
Conditional		
Modularity		

Figure 2 – Algorithm flowchart

My Notes

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Evaluation

We evaluate an algorithm to see if it offers a good solution and is created for the purpose intended. The skill of evaluation is the capability to evaluate whether various features of algorithms are correct or not (e.g., clearly instructed, properly ordered, etc.), and whether they are fast and economical enough.

The evaluation enables us to ensure the algorithm works, we can find the errors and solve them (Testing and Debugging).

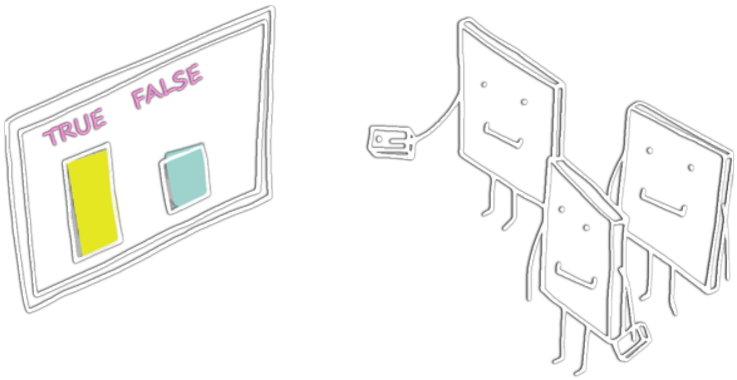

Figure 3 – Evaluation

- The achievement level of success indicators shows the efficiency of the process or algorithm you created.
- Feedback from users or practitioners contributes to the evaluation process.
- The summative evaluation leads us to the formative evaluation. So, both evaluation processes should be considered.

My Notes

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Generalisation

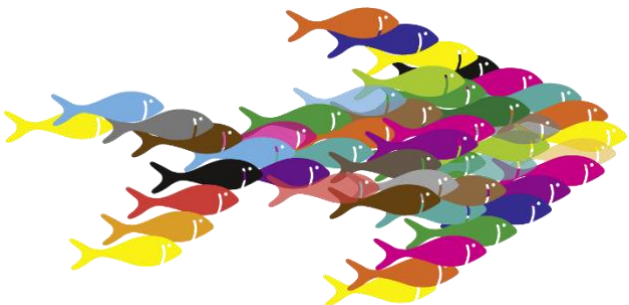
Generalisation is a way of solving new problems quickly by benefiting from previous problem-solving experiences. An algorithm created to solve a problem can be applied in the solution processes of similar problems.

For example, the algorithm used to make daisy tea can be used to make melissa tea or other kinds of herbal tea. This enables us to reuse an existing algorithm instead of creating a new one. Or we can build upon an existing algorithm to create a new one. And we can also mix algorithms to create more complex ones through generalisation. In this way, our work is simplified (Reusing and Remixing).

Figure 4 – Generalisation

What do you generalise (follow the same steps for similar processes) in your daily life? Can you give a couple of examples?

You can write below.



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Abstraction

Abstraction is another way of thinking about problems and systems. It hides (or overlooks) details and eliminates unnecessary complexity. The skill of Abstraction enables us to select the right details that must be hidden in order to reveal the real problem to focus on. It is a way of creating complex algorithms.

Different representations of a problem facilitate us to perform different tasks. It is necessary to select the representation to define the purpose of the problem. This skill dimension refers to the ability to explore the connections between the whole and the pieces (Abstracting and Modularising).

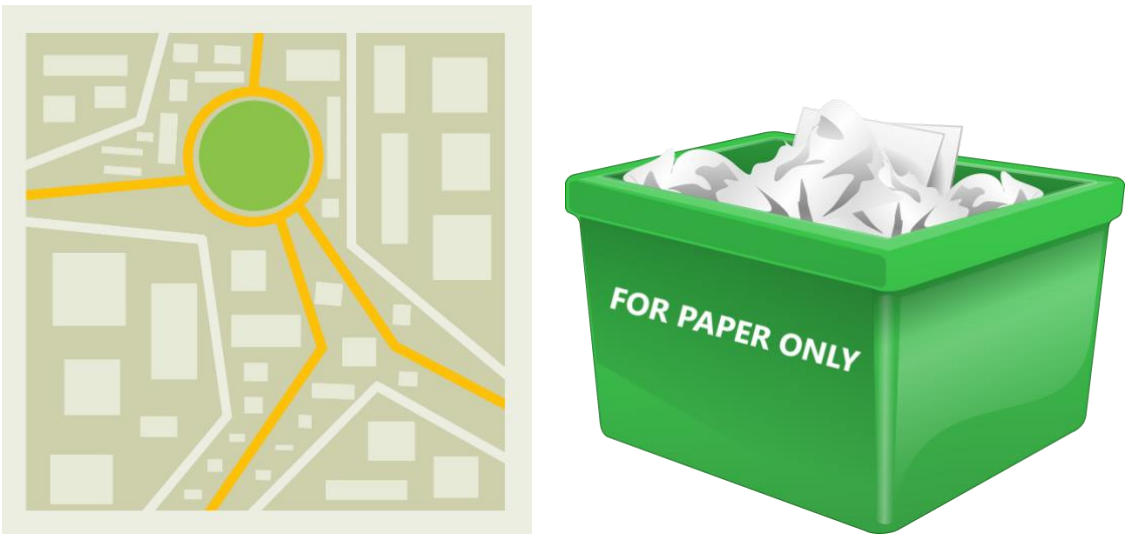

Figure 5 – Abstraction

Pay Attention:

- If we ask children to bring us only the small-size story books from the shelves, is it an abstraction?
- Or, if we ask them to take away only yellow toys, is it an example of abstraction?
- You can find different examples of abstraction yourselves in early education and discuss if they are suitable to teach this skill dimension.

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Decomposition

It is the ability to break down a complex problem or structure into smaller pieces. It is the way of thinking about problems, algorithms, processes, products, and systems in terms of their own pieces. The pieces broken down can be understood, developed, and evaluated separately after the decomposition process.

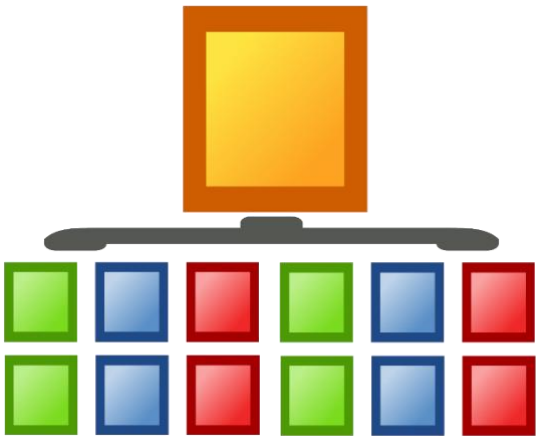

Figure 6 – Decomposition

Optional Activity: Worksheet 6

- Examine the decomposition process examples.
- Create your own decomposition process.
- Think about how we use decomposition in our daily life.

My Notes

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MODULE 1 – SESSION 2

What is a Loop

LESSON PLAN

Learning gains

Generate an algorithmic solution for a problem situation.
Use a loop for a problem case.
Combine decision making and looping for a problem situation.
Perform basic debugging.
Engage in logical reasoning.

Time

2 hours

Methods and techniques

Activity-based teaching methods
Discussion techniques: (think, pair, share)
Group and individual work: Worksheets

Resources, tools, and equipment

Texts, PowerPoint Presentation, Worksheets

Previous topic/lesson

Module 1 – Session 1: The Concepts and Dimensions of Computational Thinking

Prerequisites (knowledge, skills, etc.)

Students should know about categorising according to the characteristics of the data and performing sequential operations.

Next topic/lesson

Module 1 – Session 3: Mixed algorithms and evaluation

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IMPLEMENTATION OF THE LESSON

INTRODUCTION

GAINING ATTENTION

Start the lesson with any online metronome (for example https://www.imusic-school.com/en/tools/online-metronome website) to show a very simple repetitive operation. And ask students if they have any ideas on how this is done on the website. The expected answer here is to say that the system makes a sound every 1-2 seconds. The thinking process can be elaborated on by asking how the metronome progresses/performs when accelerated or decelerated.

MOTIVATION

State that:

"In today's world, it is expected that individuals, including children, should have different thinking skills such as critical thinking, computational thinking, etc. In this context, as preschool teachers of the future, it is expected that you will have basic knowledge of terms such as algorithm, loop, debugging and evaluation, etc. in order to provide children with the fundamentals / basics of computational thinking.

Computers use different methods for problem solving, just like the situations we encounter in everyday life. While solving a problem, we perform many operations such as arithmetic and logical operations, making decisions, performing iterative operations, and sorting according to some criteria. In today's lesson we will focus on loops for repetitive processes and decision making based on one (or more) criteria. Loops are algorithms that computers often use for repetitive processes."

Students can be asked to give examples of repetitive processes that we encounter in real life situations. Try to elicit the answers. (At this stage, the focus can be on routine repetitive steps rather than complex cycles.).

STATEMENT OF THE LEARNING GAINS

Tell students that they will learn about loops to solve a real life problem situation. Loops can often be used for simple (and complex) repetitive operations. Loops help us to solve repetitive processes that we encounter in real life. Also, computers use loops for different processes.

Often, loops can also be designed to include the decision-making step(s). In this way, loops can be planned not only for performing a routine operation, but also for more complex processes.

DEVELOPMENT

IMPLEMENTATION OF THE LESSON CORE

Use "What is a Loop?" slides presentation to introduce your students to basic terminology about loops.

The question "Let's take the metronome example at the beginning of the lesson, how would we describe it if we were describing it with a loop" is directed to the preservice teachers.

Here, preservice teachers are expected to express a cycle (loop) of simply beeping every 1 or 2 seconds.

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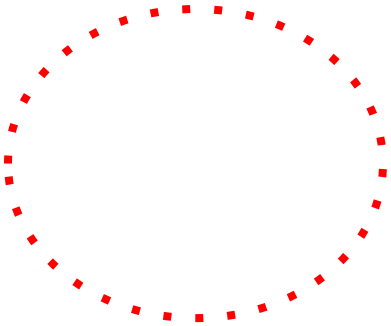
LESSON PLAN



Ask preservice teachers to give examples of similar basic loops from daily life.

An example would be music software such as Spotify. The software plays the next track in a sequential order (or random). It can be mentioned here that while the software plays the next music track in the sequential playlist, it just plays the next one. However, when it is in the random play mode, it makes a decision about which song to play randomly, but the details of the random subject should not be included in the discussion.

If the preservice teachers did not express themselves explicitly, the instructor gives the final example: Let's say we shopped and stuffed the products into a large shopping bag. We have different products in the shopping bag, such as dairy products, meat products, vegetables, beverages and pulses.

Ask preservice teachers:

“What if we were placing these products in the refrigerator without any conditions? How would we create an algorithmic loop?”

Write the alternative answers on the board.

If there is no statement in the answers how to start and end the process, state that “we do not know when the process will start and end”.

Discuss a written algorithm as follows:

1. Start
2. Take the product from the shopping bag.
3. Place the product on the empty shelf in the refrigerator.
4. Take the product from the shopping bag.
5. Place the product on the empty shelf in the refrigerator.
6. Take the product from the shopping bag.
7. Place the product on the empty shelf in the refrigerator.

... so when do we stop?

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State that:

"Of course, we will stop when there is no product left in the shopping bag, but we humans see it visually and make a DECISION. So how do we get the computer to make that decision?"

In fact, until there is no product left in the shopping bag to the computer, respectively:

1. Take the product from the shopping bag
2. Place the product on the empty shelf in the refrigerator

We want the computer to repeat the above two process steps. It is our loop. So, in this case, our algorithm should be:

Start

1. Take the product from the shopping bag
2. Place the product on the empty shelf in the refrigerator
3. If there is product in the shopping bag, continue from 1

State to preservice teachers: "Yet there is a shortcoming in our algorithm for an exceptional case? Any guesses?"

The answer is:

"If the shopping bag is empty at first, the computer will start the process to take a product from the shopping bag, but it will freeze because there is no product in the shopping bag. Therefore, we need to start the process by first checking if there is any product in the shopping bag."

In this case we can update our loop like this:

Start

1. If there is product in the shopping bag, continue:
2. Take the product from the shopping bag.
3. Place the product on the empty shelf in the refrigerator.

While developing a program in a computer environment, we usually show the process steps with a flowchart. The flowchart of the loop we wrote can be visualised as follows:

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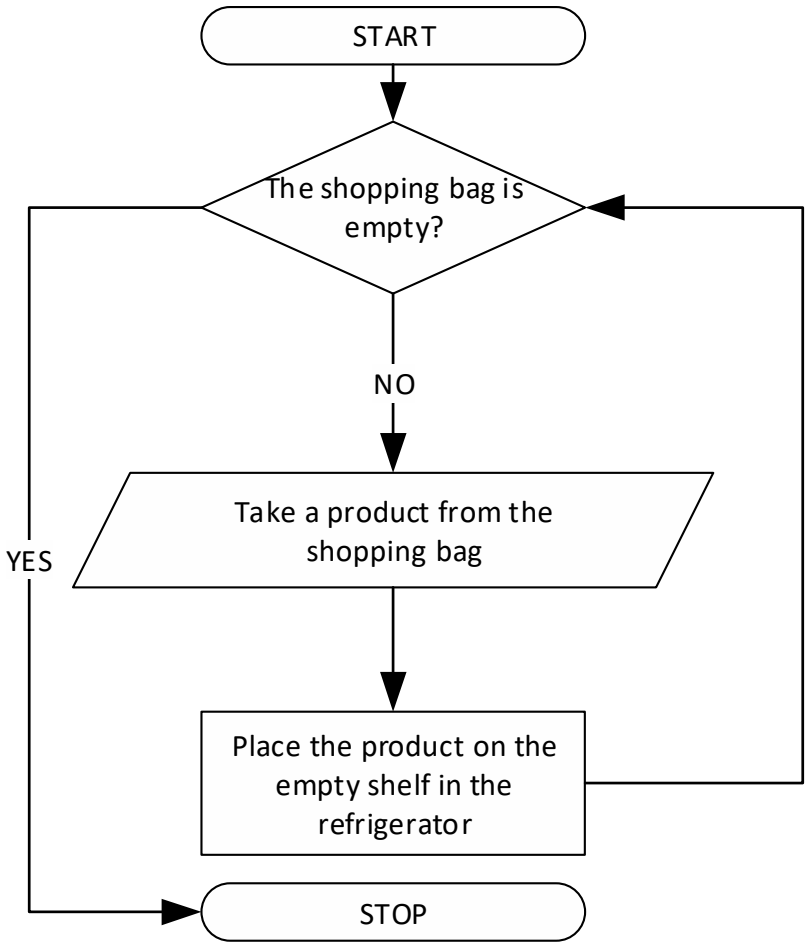
LESSON PLAN



It should be noted that we did not consider any criteria/condition when placing the products in the shopping bags in the refrigerator.

At this stage, the Activity 1 "Placing in the Refrigerator" will be carried out in the classroom with the preservice teachers. The preservice teachers are asked to work in groups of 2 or 3 to create the algorithm that includes the loop, taking into account the criteria given.

At this stage, instructors should create a discussion environment so that preservice teachers are able to see each groups' solutions and think critically about the decision-making processes and loop. At the end, the instructor shares the solution available in the slides presentation with the preservice teachers.

In order for pre-service teachers to practise, they are asked to work on Worksheet 1, again in groups of 2-3. The scenario of Worksheet 1 is arranging clothes according to the seasons.

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In the activities so far, loops without any condition and loops with a decision mechanism according to a condition have been emphasised.

At this stage of the lesson, we will try to make it more comprehensive by adding a priority condition to our existing algorithm. Activity 2 “Placing in the Refrigerator, Again” is for placing meat products in the freezer first and then placing dairy products on the first (top) shelf.

Again at this stage, preservice teachers are asked to find solutions in different groups of 2-3.

The solutions found by the groups are discussed in the class and the best/optimum solution is emphasised. The teacher details the stages of the loop and decision-making processes (according to conditions) by sharing the solution in the slides presentation with the preservice teachers.

Worksheet 2 is shared with preservice teachers so that they can make decisions according to the priority condition and practise the loop algorithm.

A two-step process can be followed for testing/debugging. First, whether the condition is used correctly can be accomplished by tracing the algorithm block step by step. At this stage, a better debugging process can be realised by assigning the algorithms (developed by the groups) to different groups.

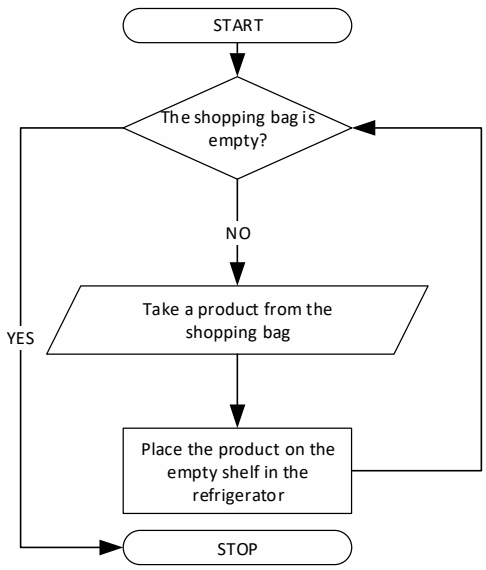
Second, it should be assumed that there is an item (for example cheese) in the shopping cart that is not specified in the conditions. In this case, brainstorming can be done on which stage the algorithm will freeze and what kind of solution is needed.

Conclusion

Summarizing

Algorithms developed during the course are covered in order.

First, the algorithm flow chart is summarised, in which the products that do not have any conditions are taken from the shopping cart and placed in the refrigerator.



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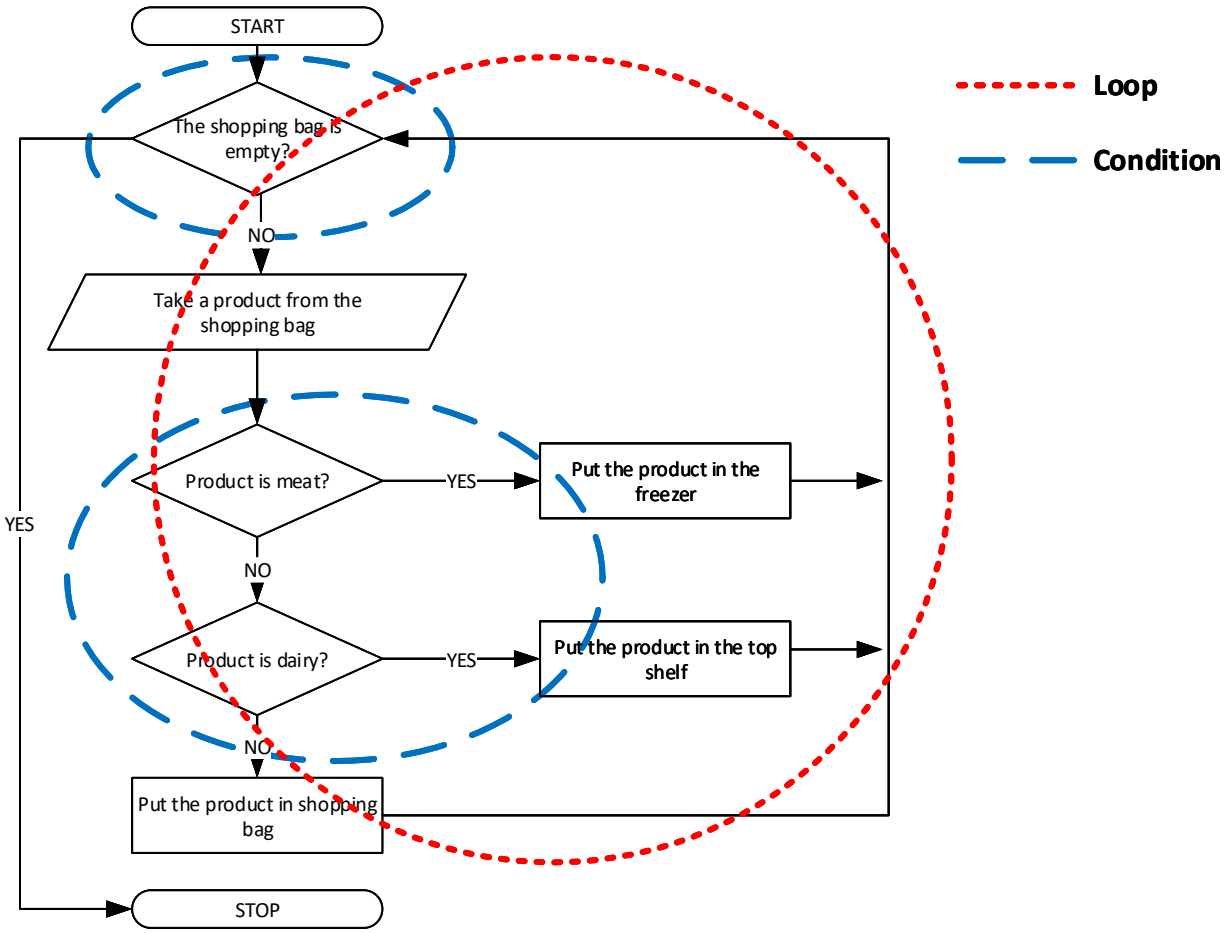
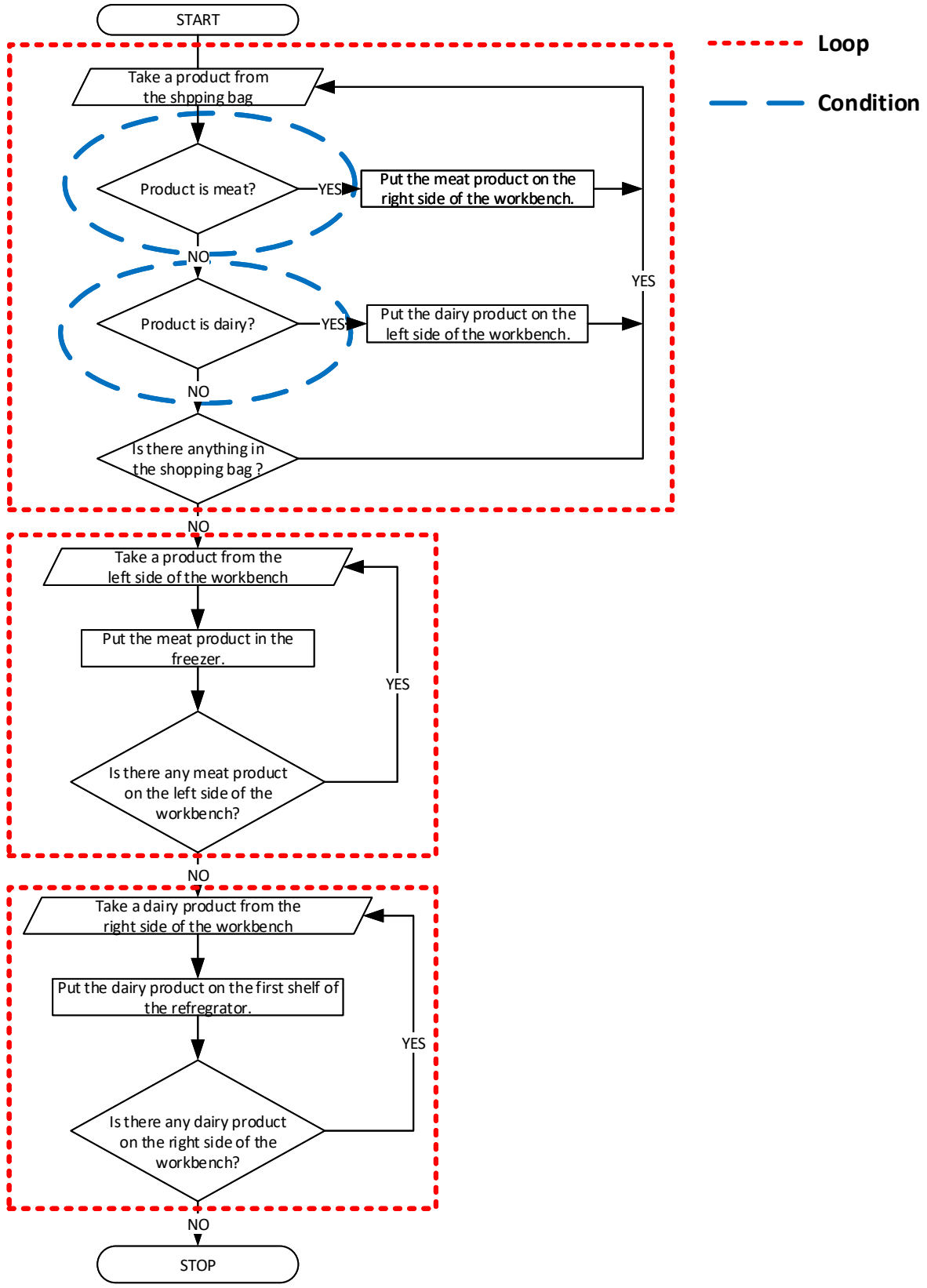
Next, the Activity 1 “Placing in the Refrigerator” algorithm flowchart is shown and explains how solutions are generated for the conditions.



Finally, when the priority is specified in the Activity 2 “Placing in the Refrigerator, Again” algorithm flow diagram – how the algorithm is developed is explained.

LESSON PLAN



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Homework

It should be stated that the next lesson will be about making pizza. Preservice teachers are asked to come prepared to the next lesson by doing research on pizza types (kinds), stages of making pizza and toppings (ingredients). They are requested to bring the pizza's production stages to the lesson ready with a pseudo code (written verbally) or flowchart.

Re-motivating (What will it do in real life?)

Nowadays, computational thinking has become one of the most important skills to acquire. Computational Thinking is among the important skills that both you as preschool teachers and children at the basic level are expected to have. Therefore, as a part of computational thinking, thinking about problem solving steps, being able to create algorithms and debugging them are among the skills you should have. In this way, you will have the knowledge and experience to teach children the basics of these skills.

Evaluation or testing

Students will do the self-assessment on Module 1 – Assessment Form

End

End the lesson and say goodbye to the students.

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WORKSHEET 1

Algorithm Design.

Designing the algorithm that includes the loop, and taking into account the criteria given.

You have a wardrobe and you are asked to place clothes inside it. Can you create an algorithm to arrange the clothes according to the seasons or according to the colours, in this wardrobe with four divisional structures?

Group work

4. You can make an algorithm graphically (flowchart) or non-graphically (pseudocode-verbal)
5. You can use https://www.diagrameditor.com/ to draw a flowchart.
6. You can use any text editor to prepare a pseudocode.
7. Explain your algorithm as in Activity-1. Which CT concepts are used?
8. Debug your algorithm. Is everything ok?
9. Compare your algorithm with your colleague's algorithm. Which solution is more suitable? Why?]

Good Practice	Challenges

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WORKSHEET 2

Algorithm Design & Evaluation.

Design an algorithm to solve a problem. Then debug the algorithm and check it is the optimum solution according to the data.

You have a wardrobe and you are asked to place clothes inside it, in the order of the seasons – winter, summer, autumn and spring. Can you create an algorithm to arrange the clothes according to the order of the seasons in this wardrobe?

Group work

1. You can make an algorithm graphically (flowchart) or non-graphically (pseudocode-verbal)
2. You can use https://www.diagrameditor.com to draw a flowchart.
3. You can use any text editor to prepare a pseudocode.
4. Explain your algorithm such as in Activity-2. Which CT concepts are used?
5. Debug your algorithm. Is everything ok?
6. Compare your algorithm with your colleague's algorithm. Which solution is more suitable? Why?

Good Practice	Challenges

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HANDOUT

The use of concepts & dimensions in early childhood education activities

Placing food in the refrigerator

This activity is an example of using data, conditions, sequence, loop and debugging.

Task: Place the meat and dairy products from the shopping bag in the refrigerator

- **Data:** The products in the shopping bag
- **Condition 1:** meat products must be placed in the freezer.
- **Condition 2**: dairy products must be placed on the first (top) shelf.
- **Sequence & Loop:**, place the products one by one by checking them according to the conditions until the shopping bag is empty
- **Debugging:** Q-1: Are all the products in place? Q-2: What if the shopping bag does not have a product specified in the conditions?

My Answers

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HANDOUT

The flowchart below shows the algorithm for placing food in the refrigerator.

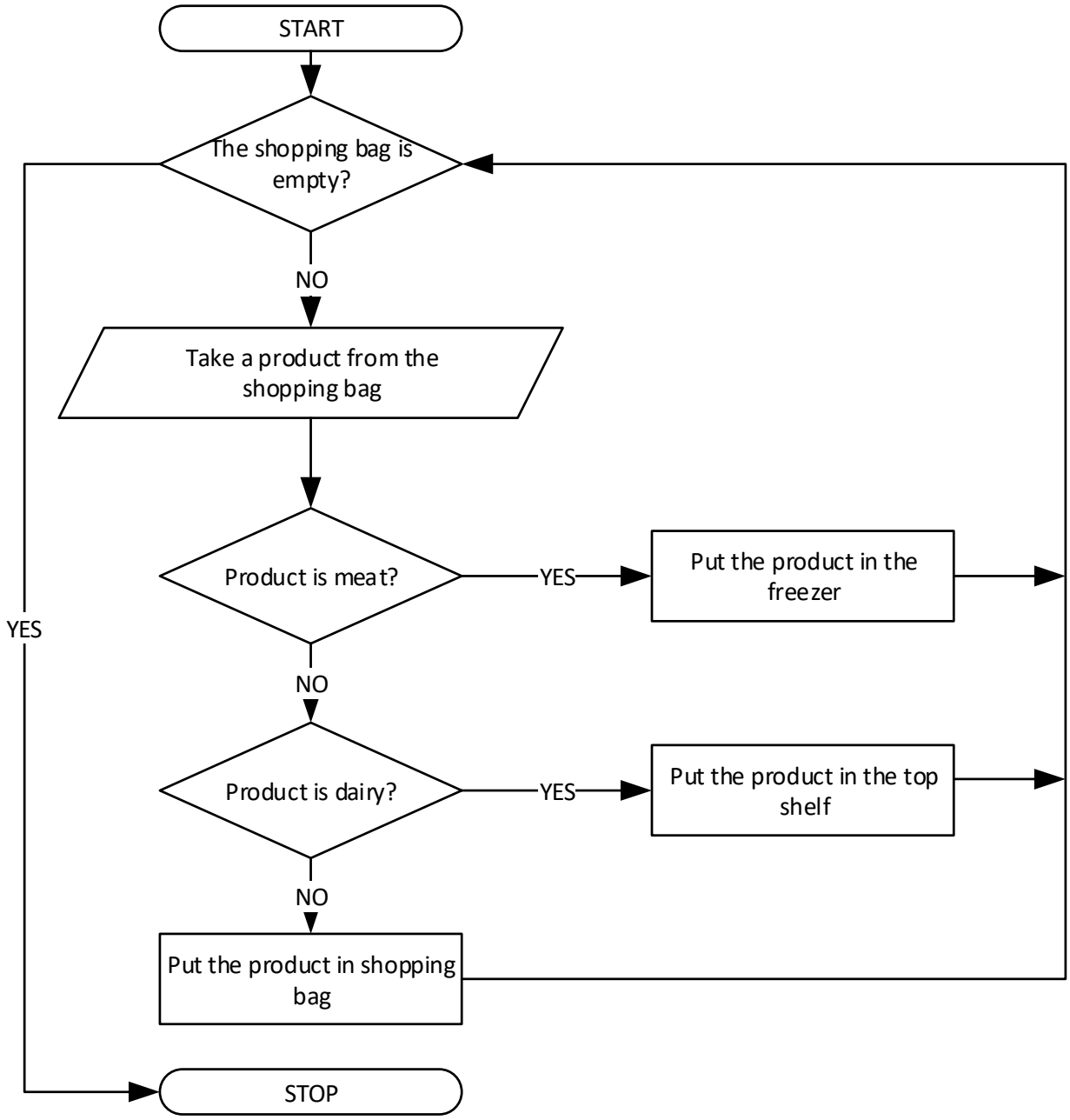

Diagram 1 – Algorithm of refrigerator organisation

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HANDOUT

The flowchart below shows the loops and the conditions in the algorithm.

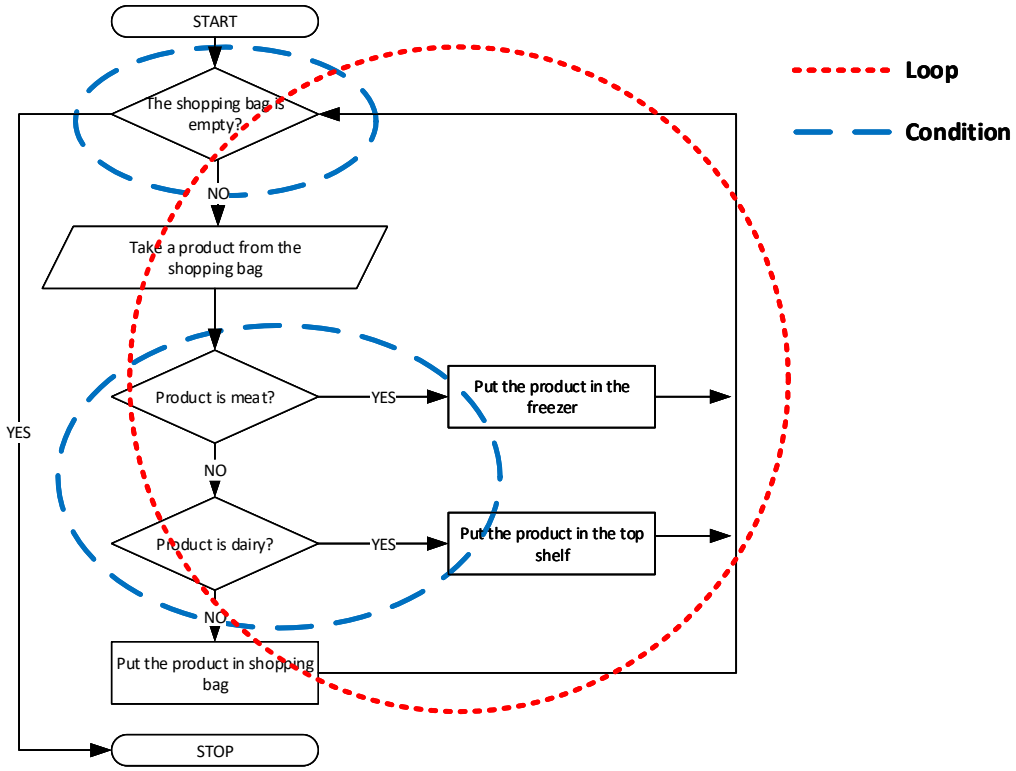

Diagram 2 – Loop and the conditions in the flowchart

How do we make decisions?	We make decisions based on conditions.
What do we do if there is no condition that determines the "decision"?	We go back to the beginning without making a decision.
How many times do we do the transactions? How many iterations are there?	We repeat the process as much as the number of meat and dairy products in the bag.
What determines our repeat count?	The amount of product in the shopping bag.
If two conditions (meat or dairy) change places, will the number of iterations change?	No. It is not change! Why?
What happens if the shopping bag is empty?	The algorithm ends.
What happens if there are any product left in the shopping bag?	This is endless loop!

Figure 1 – Algorithm for placing food in the refrigerator

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Placing food in the refrigerator, again

Task: We shopped for meat and dairy products from the market. There are the meat and dairy products in the shopping bag, and now we're going to put them in the refrigerator.

- **Data:** The meat and dairy products in the shopping bag
- **Condition:** First, meat products must be placed in the freezer, and then dairy products must be placed on the first (top) shelf.
- **Sequence & Loop:** Until the shopping bag is empty, group the products one by one by checking them according to the condition (about the product type), and then until all products are placed, place the grouped products according to the condition (about the matter of the priority of product type).
- **Debugging:** Q-1: Are all the products in place? Q-2: Is there any product placed on the wrong shelf?

My Answers

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HANDOUT

The flowchart below shows the algorithm for placing food in the refrigerator (with the new instruction).

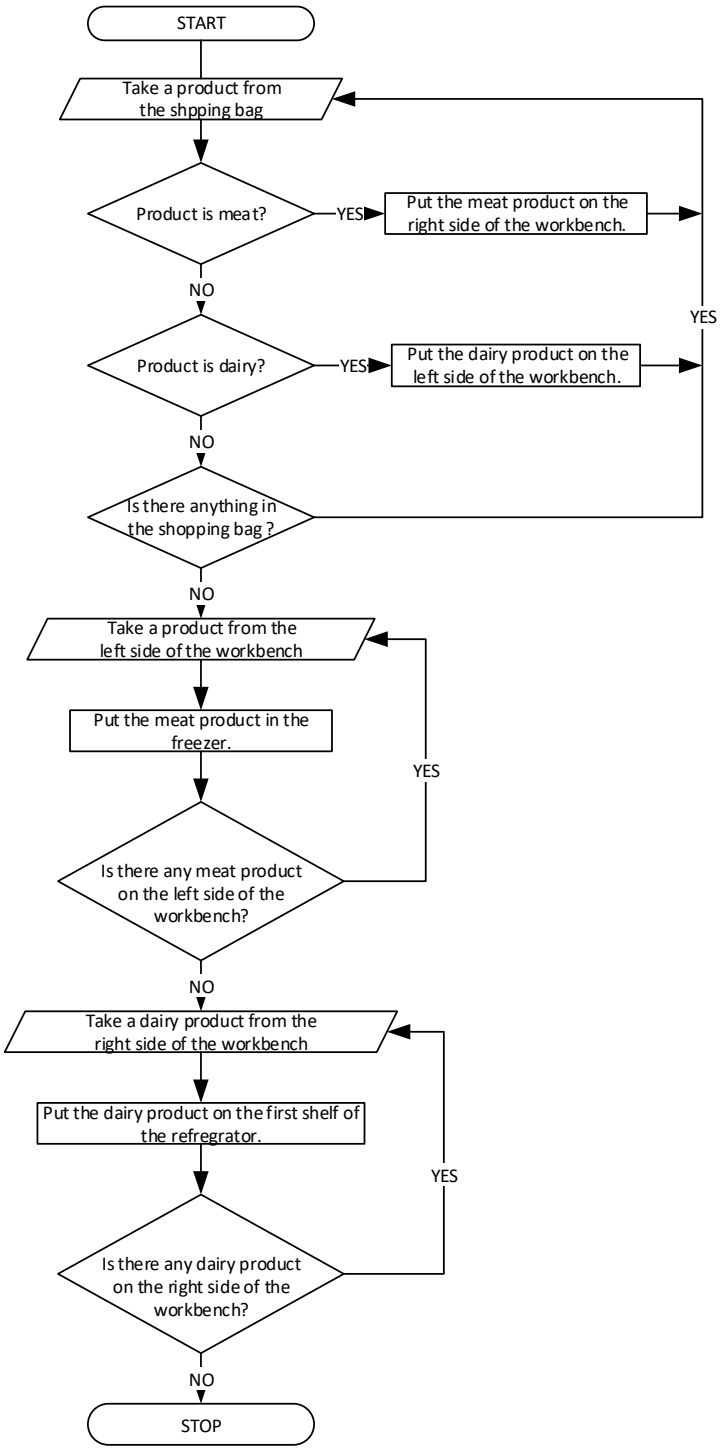

Diagram 3 – The algorithm of the new instruction to place food in the refrigerator

HANDOUT

The flowchart below shows the loops and conditions in the new algorithm.

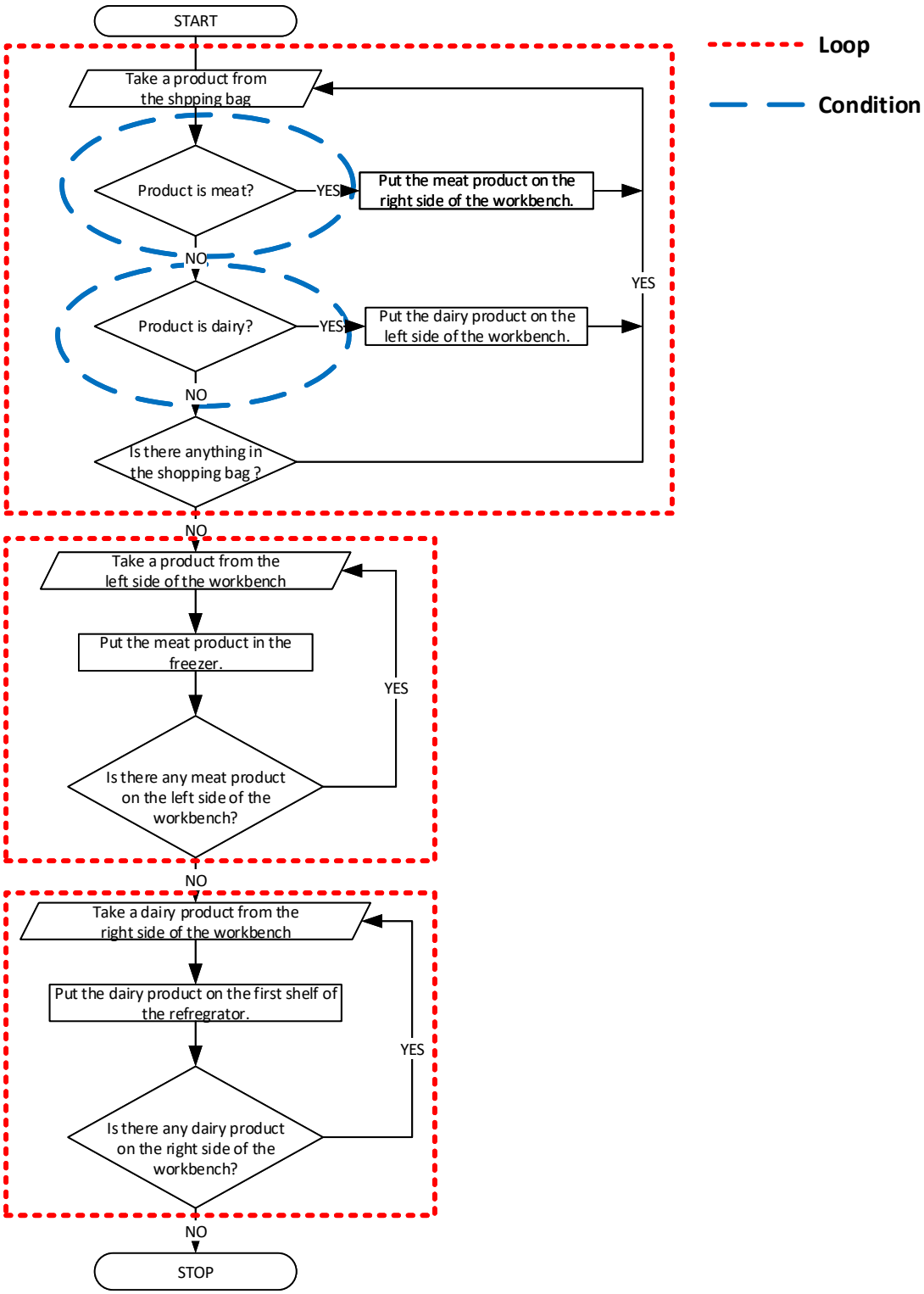

Diagram 4– The loops and conditions in the new algorithm flowchart

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HANDOUT

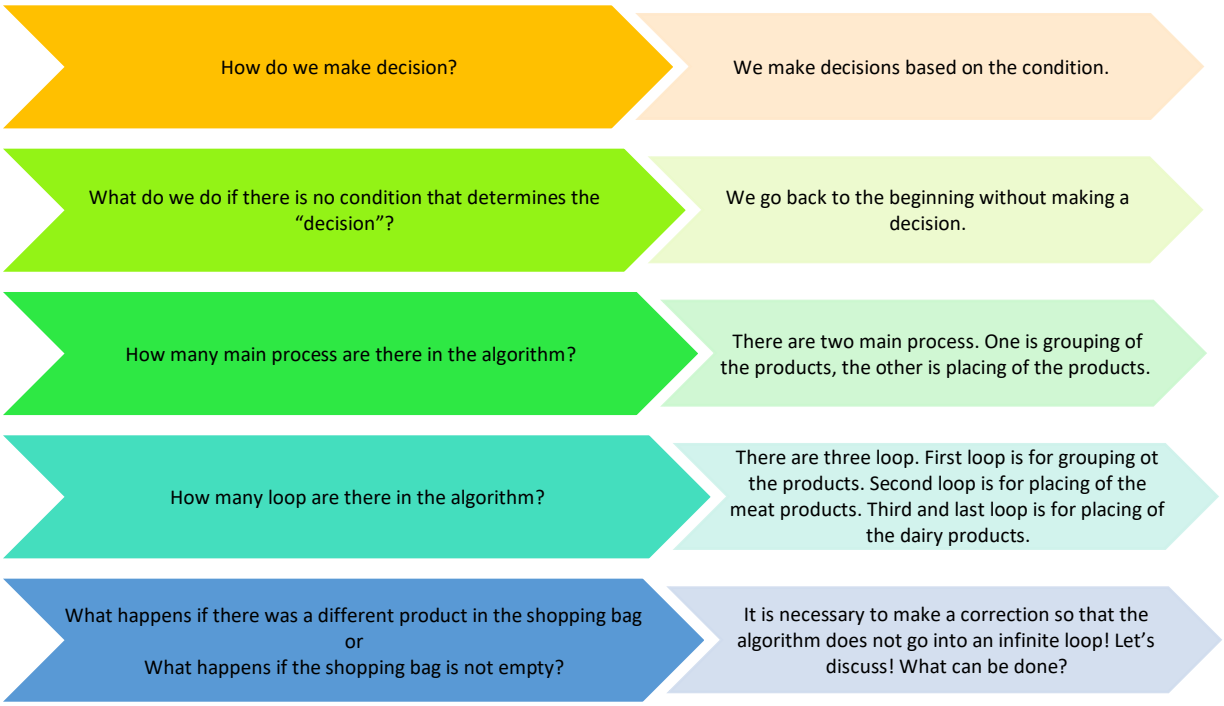

Figure 2 – Algorithm details for placing food in the refrigerator

In this session, you can do the following activities.

For the first algorithm:

- Arrange clothes according to the seasons: winter, summer, autumn and spring.
- Use Worksheet 1

For the second algorithm:

- Arrange clothes in the order of the seasons: winter, summer, autumn and spring.
- Use Worksheet 2

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MODULE 1 – SESSION 3

Mixed algorithms and evaluation

LESSON PLAN

Learning gains

Generate a mixed algorithmic solution for a complex problem situation.

Debug and evaluate algorithms according to different criteria.

Think critically and creatively to solve a problem.

Time

2 hours

Methods and techniques

Activity-based teaching method

Discussion techniques: (think, pair, share)

Group and individual work: Worksheets

Resources, tools, and equipment

Texts, PowerPoint Presentation, Worksheets

Previous topic/lesson

Module 1 – Session 2: What is a Loop

Prerequisites (knowledge, skills, etc.)

Students should know about the basics of loops and be able to combine decision making and looping for a problem situation.

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LESSON PLAN

IMPLEMENTATION OF THE LESSON

INTRODUCTION

GAINING ATTENTION

The research homework given in the previous lesson should be shared. It should be stated that these recipes will also give us ideas for the later stages of the course.

It should be stated that “the representation of real life situations in a computer environment is important. We encounter many different electronic devices such as robots that sweep the house, autonomous vehicles, and devices that cook. The world of the future will be the world of generations who design, code and create creative products for these devices. In this respect, it is important that today's children and future adults are equipped with these skills”. In order for children to gain these skills, teachers/parents should also have knowledge about these issues.

MOTIVATION

The importance of gaining experience in 21st century skills should be emphasised. In this context, it should be stated that “today's lesson will go into a little more detail on algorithms and focus on gaining experience in skills such as critical and creative thinking”.

STATEMENT OF THE LEARNING GAINS

Accordingly, “at the end of today's lesson, the following learning outcomes will be focused on generating a mixed algorithmic solution for a complex problem situation (Yes! Making pizza is a complex process)

We performed simple debugging to see if the algorithms we developed in the previous lesson were correct or not. In today's lesson, we will try to evaluate whether our algorithm will work more effectively and efficiently.

We will try to contribute to our critical thinking with all these problem solving processes, and we will try to produce alternatives by thinking creatively.”

DEVELOPMENT

IMPLEMENTATION OF THE LESSON CORE

“We talked about loops in the previous lesson. We carried out activities on how we can algorithmically define the processes that we encounter in daily life, which have repetitive processes. We went from the simplest loop (remember, we started with the metronome example) to loops with decision making mechanisms. When placing products in the refrigerator, we first placed the products unconditionally, and then designed a replacement algorithm according to the criteria.”

In today's lesson, as stated before, we will work on mixed algorithms for more complex problem situations and we will perform the evaluation process to make our algorithm more effective and faster.”

The lesson starts with the Activity 1: “Let's Make Pizza!”. The slides presentation opens and Let's Make Pizza! The effectiveness of the lesson is explained on the slide. (An example of pizza types and a topping list is included at the end of this lesson plan). “Let's Make Pizza!” activity is for preservice teachers to make a pizza robot. Preservice teachers will work on a pizza robot algorithm, taking into account the specified criteria (make the pizzas in order and use all toppings for the corresponding pizza).

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LESSON PLAN

The main purpose of the activity is to encourage preservice teachers to think about pizza making processes for 3 different types of pizza, and to design the most efficient pizza making algorithm by considering common processes and toppings.

In this activity, the pizza making process should be carried out in two stages. In the first stage, separate processes should be designed for each type of pizza. In this way, preservice teachers will first experience 3 different pizza making processes. The result of this activity will be a solution that works but is fast and uneconomical. In fact, the next stage (the second activity) will focus on the evaluation process so that the solution at this stage can be faster and more economical.

Preservice teachers should be asked to create algorithms for the pizza making process “in order” in groups of 2-3, as explained in the activity. 6-7 minutes should be enough. At this stage, making the pizzas “in order” is important both to solve the problem situation in the simplest way and to form the basis for the next activity.

Working groups are expected (without going into too much detail) to produce a list of steps similar to the one below for “a pizza”:

1. get the recipe first (for the toppings list of the corresponding pizza)
2. get the pizza base
3. get the topping specified in the recipe from the workbench
4. sprinkle the topping on the pizza base
5. If it's not the last pizza topping in the recipe, take the next topping (step 3) and sprinkle it on the pizza (step 4) base.

At this stage, the algorithm we created for making “a single” pizza includes a simple loop: take a topping specified in the recipe and sprinkle it over the pizza base.

If there are 3 toppings in the recipe for the relevant pizza, these steps will be repeated 3 times. If there is no other topping left in the list in the recipe, the preparation phase of the pizza is complete. The next stage will be the cooking stage. In order not to make the process even more complicated, the cooking details are not included in this activity. But depending on the skill levels of the preservice teachers, the cooking stage can also be discussed. Even more advanced scenarios where the cooking times of each pizza may be different can be considered, if appropriate

The groups should be asked to draw their algorithms as flowcharts. The algorithms created by the groups should be shared with other groups and the use of systematic thought is emphasised.

Since 3 pizzas are to be made separately and in order, the algorithm that the groups will create at this stage is expected to be something like this:

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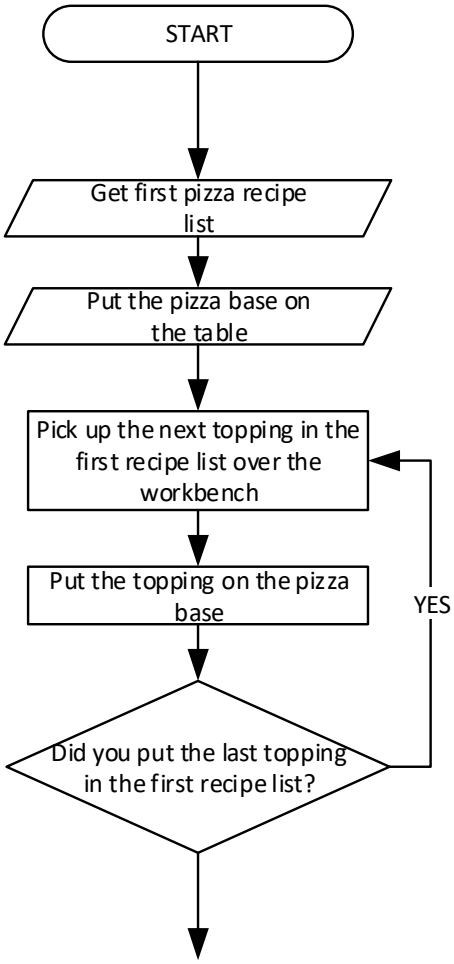
LESSON PLAN



This algorithm will continue 2 more times consecutively.

The instructor shares the algorithm for pizza making “in order” with the pre-service teachers on the flowcharts on the 4th slide. Debugging is done step by step through the algorithms (flowcharts). In the debugging process, focus on whether the code works correctly as intended. For debugging the main question is: “Are 3 pizzas ready including the toppings outlined in the corresponding recipe?”

Slide 5 is opened and the questions asked to discuss the details of the algorithm. It should be emphasised that making the pizzas in a different order (1-2-3, 2-1-3, or 3-1-2) does not make a difference. It should be especially emphasised that the duration has not changed. (In the next activity, common steps will be organised in a single loop to shorten the time.)

At the beginning of the lesson, the pizza making process was mentioned in two stages. In the first stage, sequential algorithms were designed for the first pizza, then the second pizza, and the third pizza. Algorithms for each pizza making process contained a simple loop for sprinkling the toppings. Now for the second stage, ask the pre-service teachers the following thought-provoking questions:

Although some of the toppings of the pizzas are different, can we make the pizza making process more efficient in terms of time and effort? After all, we are trying to design a robot?

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Different solutions are expected at this stage. The groups will carry out a creative thinking process in discussion with each other.

Responses from the class should be organised. The expected answer should be that the "common steps" to pizza making can be planned together. For example, instead of making the pizza bases separately, 3 pizza bases can be placed side by side on the workbench. Then the common toppings can be sprinkled on all 3 pizzas in turn.

On Slide 6, the instructor explains the difference between debugging and evaluation. While debugging is for an algorithm to work as desired, evaluation is for an algorithm to work better (faster, more economical, more efficient, etc.).

Pre-service teachers are asked to work in groups of 2-3 on how they can make the pizzeria robot faster and more economical (preferably in the same groups as the groups will improve the algorithms they developed in the previous stage).

Groups share their solutions with their classmates by creating pseudocode-(verbal) and flowchart using Worksheet 1. The class exchanges ideas on how to find the most optimal algorithm solution. The debugging process is carried out step by step through the code blocks on the algorithm chosen as the most optimal.

A similar activity will be carried out so that what has been learned can be applied to another problem situation. In the slides presentation, the "Let's Arrange the Wardrobe" activity (on the 7th slide) will be done.

Preservice teachers will perform the activity in groups of 2 or 3. In this activity, preservice teachers will create an algorithm for a robot that chooses clothes for every day, taking into account different weather conditions (sunny, rainy, snowy, windy).

As a hint, there should be a brief exchange of ideas with alternative approaches and thought-provoking questions on slide 8. Groups are given 5-6 minutes to develop their algorithms. After the groups have completed their work, the groups' algorithms are examined and discussed in class.

Algorithms are distributed to different groups for the debugging of the algorithms developed. Afterwards a brainstorming session is carried out to see if there are faster and more economic solutions for evaluation.

Conclusion

Summarizing

In today's lesson, we worked on mixed algorithm structures for more complex problem situations. While making the pizza robot, we first designed the pizza production in a sequential manner (in order). We discussed the question "Can we run common steps such as pizza bases and toppings in the same loop?". This thinking process (to make the algorithm work better) is actually defined as evaluation. Debugging is a concept about whether the algorithm works correctly step by step.

At the end of the evaluation process in pizza making, our algorithm turned out to work faster and more economically as follows:

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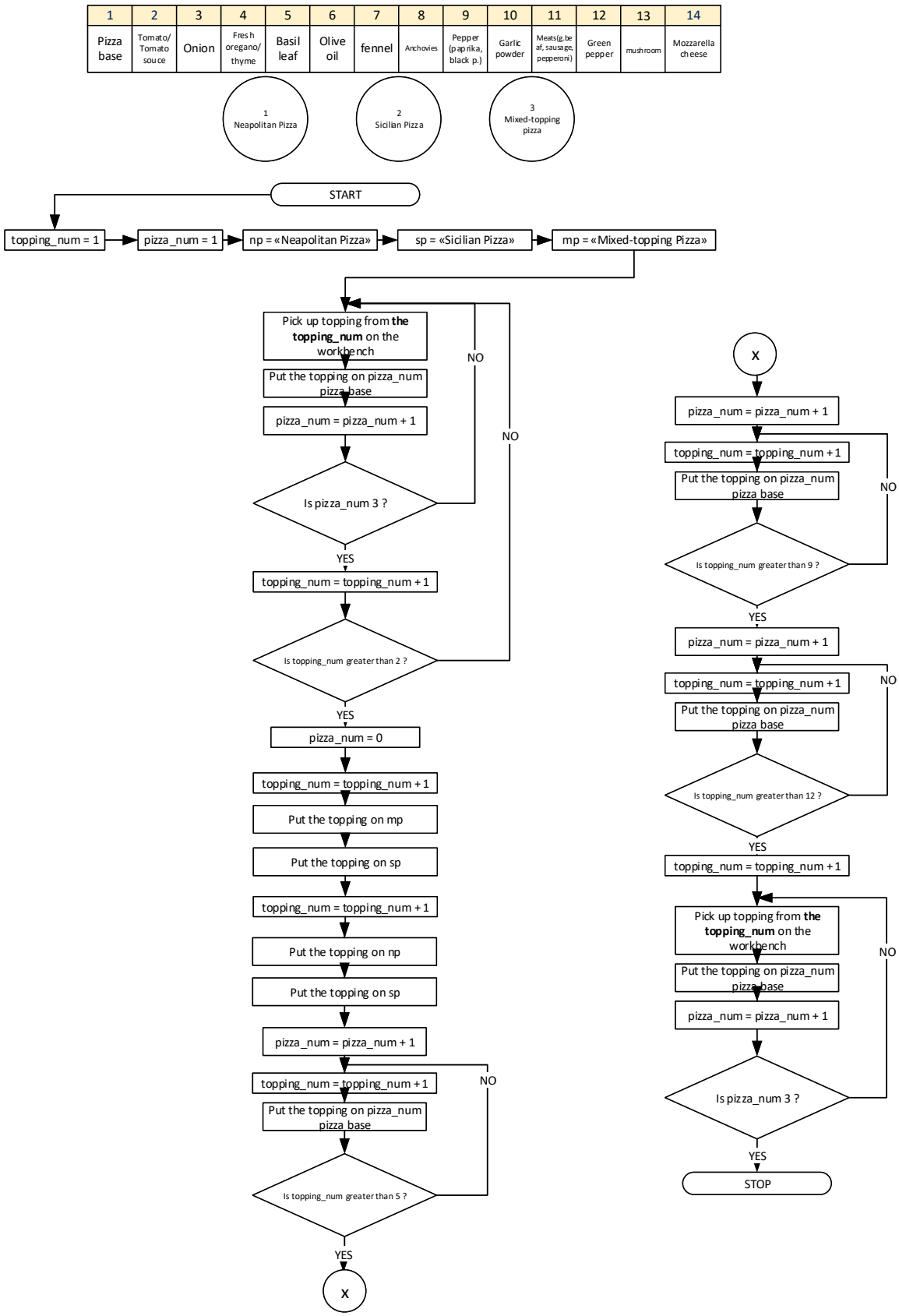
LESSON PLAN



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LESSON PLAN

While solving real life problems, we, as humans, are able to implement our thinking system instantly. We can make quick decisions and try out solutions that seem faster and/or more economical. On the other hand, when we want to transform such a process into an algorithm, we have to describe all decision mechanisms to the computer. State that "One of the optimum solutions can be seen in the flow diagram. There is always a better solution. In this context, it is suggested that you compare the solution provided with your own solutions and consider whether there is a better solution for the pizza robot."

> Note: This algorithm solution may be a bit complex for preservice teachers at this level. The aim here is to show how complex the algorithm design process can be for solving real life problems. In addition, such solutions will encourage preservice teachers to think differently and contribute to their critical and creative thinking.

We analyse the results of in-class group work together. This analysis process contributes to gaining different perspectives and understanding that the evaluation process is a dynamic process, and needs critical and creative thinking.

Homework

Worksheet 2: is given as homework.

Re-motivating (What will it do in real life?)

Computational thinking should not be limited to code blocks and algorithms. In fact, CT supports processes such as critical and creative thinking. Although these skills are generally considered within the scope of 21st century skills, they are among the most important skills that today's children and future individuals should have. It is predicted that the professions of the future will tend mostly to design and produce. In this context, it is important for the individuals of the future to meet concepts such as computational thinking early and to carry out activities within this scope so that they can have the skills of collaborative work, critical and creative thinking, problem solving and production. Now these skills have started to come to the fore for early years children, teachers / families are trying to plan activities for these age groups.

In order to transfer these skills, it is important for teachers to know the basics of computational thinking and gain experience in this regard. Such courses will contribute to the formation of these foundations so that prospective teachers can gain these skills and deliver these competencies to their students in the future.

Evaluation or testing

Preservice teachers will do the self-assessment on Module 1 – Assessment Form

End

End the lesson and say goodbye to the students.

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LESSON PLAN

RECIPE FOR 3 PIZZA TYPES

Neapolitan Pizza Toppings		Sicilian Pizza Toppings		Mixed-topping pizza Toppings	
fresh mozzarella tomatoes basil leaves fresh oregano olive oil	taze mozzarella domates Fesleğen yaprakları Taze Kekik zeytin yağı	tomato onion anchovies garlic powder thyme fennel paprika black pepper	domates soğan ançuez sarımsak tozu, kekik rezene kırmızı biber karabiber	tomato sauce mozzarella cheese ground beef sausage pepperoni onion mushrooms green peppers	domates sosu mozzarella peyniri dana kıyma sosis sucuk dilimi soğan mantar yeşil biber

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WORKSHEET 1

Algorithm Design & Evaluation

Design an algorithm to solve a problem. Then debug the algorithm and check it is the optimum solution according to the data.

There are three pizza recipes (Neapolitan Pizza, Sicilian Pizza, Mixed-topping pizza) and you are asked to program a robot to make these pizzas in an "economic" and "faster" manner.

Group work

1. You can make an algorithm graphically (flowchart) or non-graphically (pseudocode-verbal)
2. You can use https://www.diagrameditor.com/ to draw a flowchart.
3. You can use any text editor to prepare a pseudocode.
4. Explain your algorithm such as in Activity-3. Which CT concepts are used?
5. Debug your algorithm. Is everything ok?
6. Evaluate your algorithm. Is it "true", "faster" and "economic"?
7. Compare your algorithm with your colleague's algorithm. Which solution is more suitable? Why?

Neapolitan Pizza Toppings	Sicilian Pizza Toppings	Mixed-topping pizza Toppings
fresh mozzarella tomatoes basil leaves fresh oregano olive oil	Tomato Onion Anchovies garlic powder thyme fennel paprika black pepper	tomato sauce mozzarella cheese ground beef sausage pepperoni onion mushrooms green peppers

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WORKSHEET 1

Good Practice	Challenges

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WORKSHEET 2

Algorithm Design & Evaluation

Design an algorithm to solve a problem. Then debug the algorithm and check it is the optimum solution according to the data.

Let's review

1. What CT concepts did you experience in this lesson?
2. What CT skills did you experience in this lesson?
3. Can you give an example of a problem where you can apply the CT concepts and CT skills you learned in this lesson?
4. Explain your algorithm. Which CT concepts and skills are used?
5. Present your problem and its algorithm to your colleagues.
6. Is your solution (algorithm) a "suitable" solution for your problem?
7. Is your algorithm "faster" and "economical" enough?

Good Practice	Challenges

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ASSESSMENT FORM

What we learnt in this session?

Assess yourself.

1. How can I connect what I already know with what I learnt in this lesson?
2. What new ideas can I build around what I learned today to broaden my perspective?
3. What challenges or puzzles have come up in my mind from what I learned?

Connect	Extend	Challenge

You can use this assessment form for each session of the Module 1.

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HANDOUT

Mixed algorithms

A mixed algorithm refers to an approach or method that combines multiple algorithms or techniques to solve a problem or achieve a desired outcome. In this context, “mixed” indicates the use of different algorithms in conjunction with each other.

Module 1 – Session 3 – Activity 1

LET’S MAKE PIZZA!

Task: There are three pizza recipes (Neapolitan Pizza, Sicilian Pizza, Mixed-topping pizza) and you are asked to program a robot to make these pizzas in order.

- **Data:** Toppings of the pizzas on the workbench
- **Condition(s):** Make the pizzas in order, use all toppings for the corresponding pizza
- **Debugging:** Are all the pizzas ready? Are any pizzas missing ingredients?

My notes

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The mixed algorithm can be shown in the following flowchart.

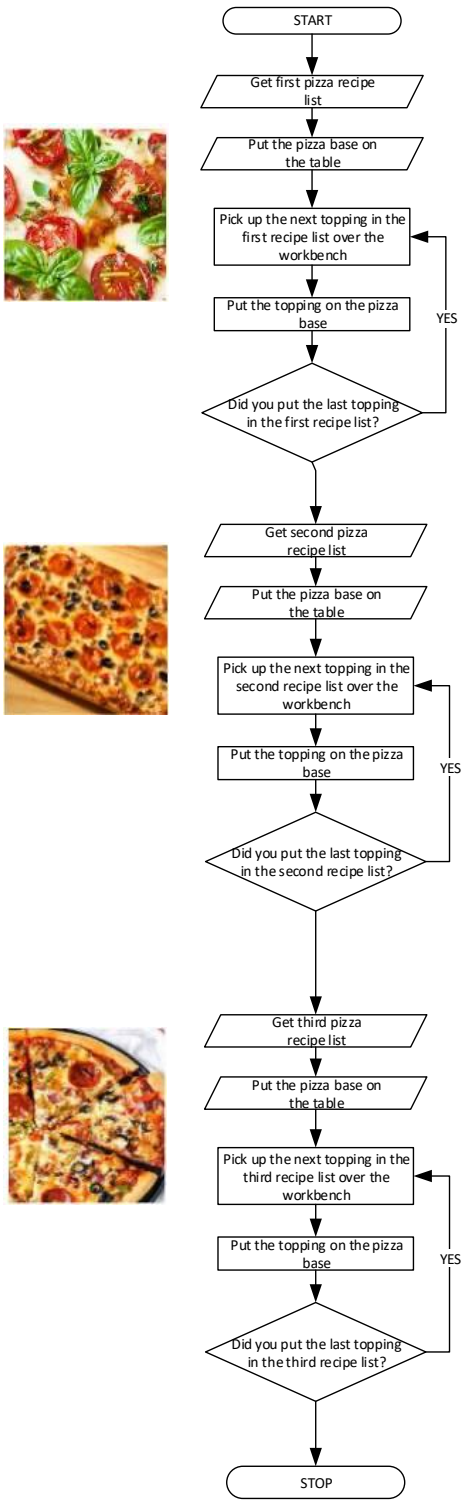

Diagram 1 – Mixed Algorithm

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HANDOUT

The mixed algorithm can also be shown in the following flowchart.

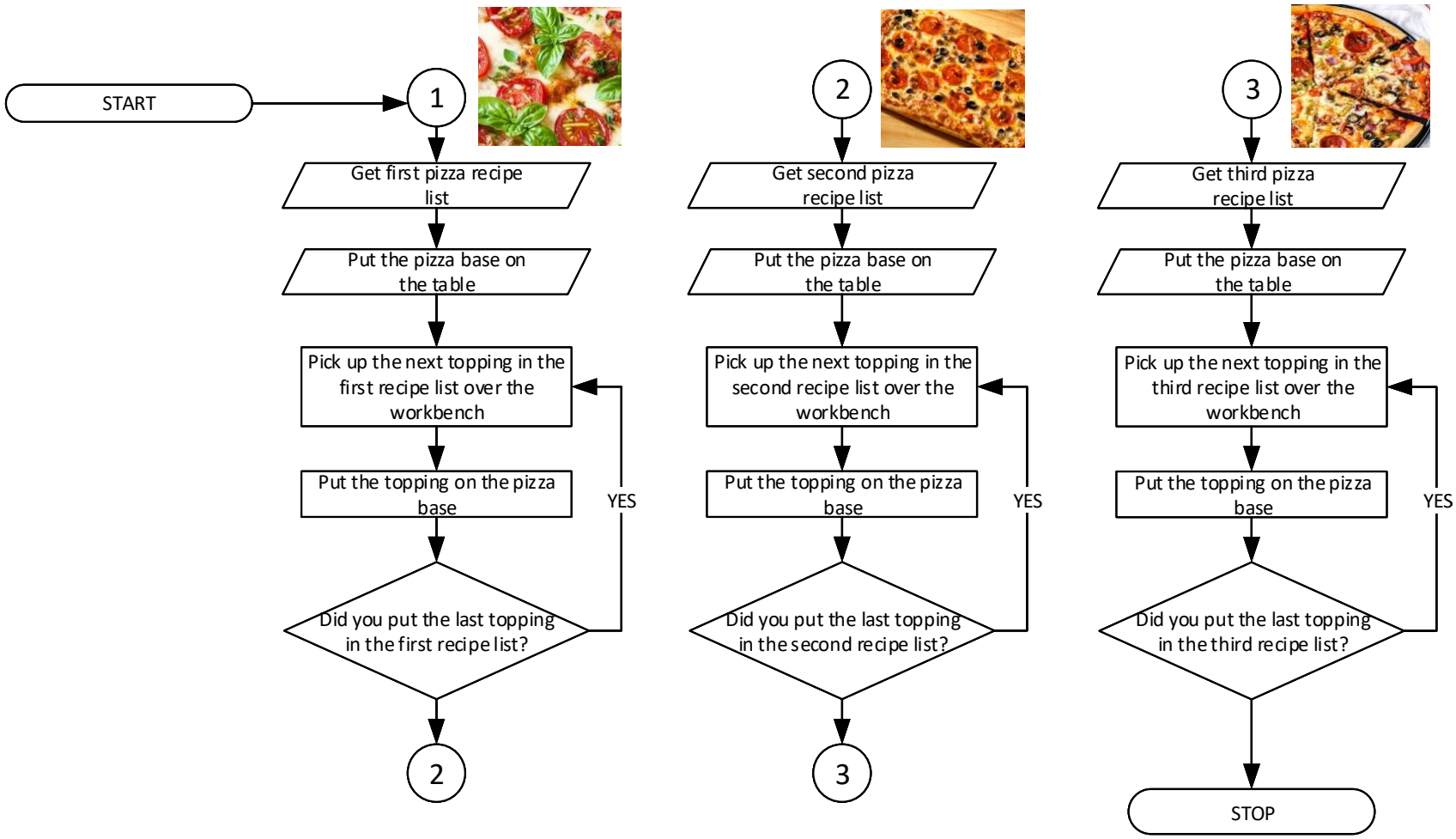

Diagram 2 – Mixed Algorithm

HANDOUT

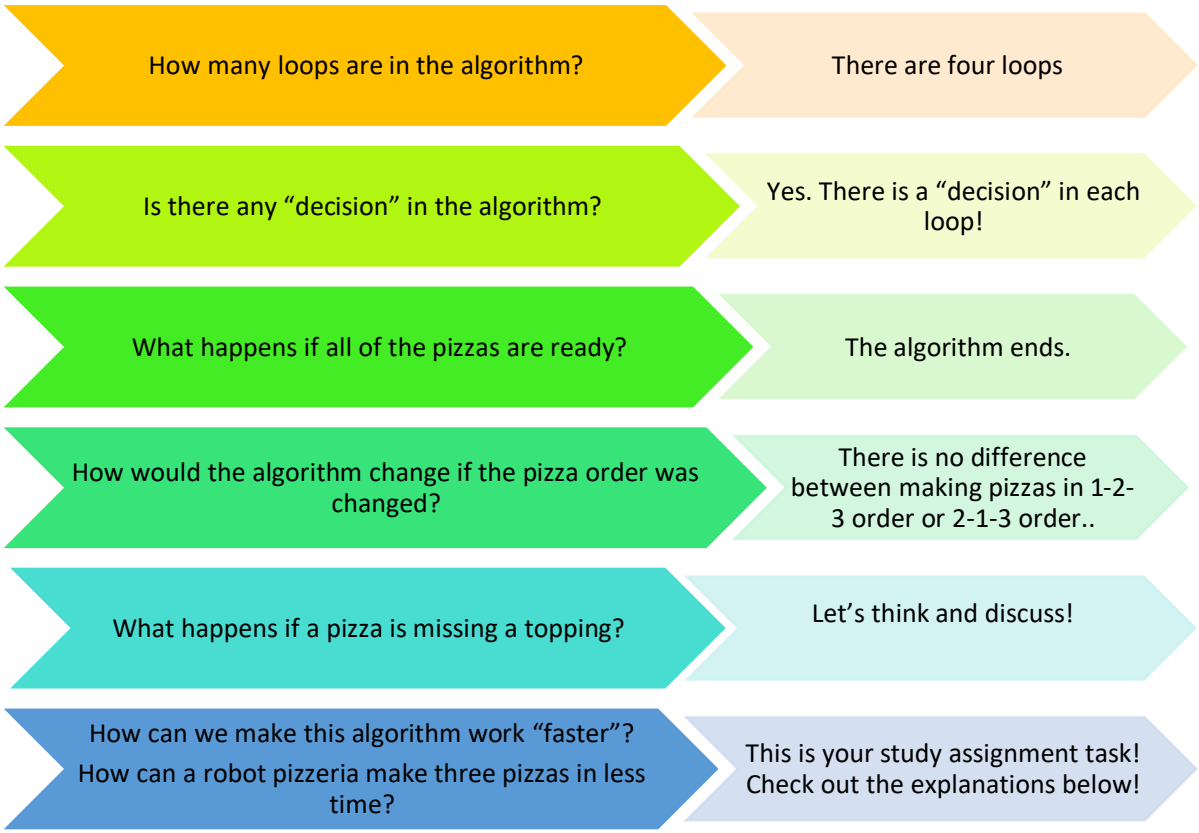

Figure 1 – Questions to reflect on the algorithm

Now, it is your turn!

- Create a «faster» & more «economic» algorithm!
- Evaluation is the ability to evaluate algorithms to assess whether their various properties are correct and whether they are “fast” and “economical” enough.
- Making sure the job sequencing (algorithm) works is called debugging. But an algorithm with the correct job order may not be “fast” and “economical” enough.
- How to make a «pizzeria robot» “fast” and “economical” enough?
- Worksheet 1

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Module 1 – Session 3 – Activity 2

LET'S ARRANGE THE WARDROBE

Task: You will program a robot to organize your 4-door wardrobe. The robot will arrange the wardrobe and choose clothes according to the 4-day weather conditions (sunny, rainy, snowy, windy) to present them to you for each day!

- **Data**: selected clothes in the laundry bag
- **Condition(s):** weather conditions
- **Debugging:** Are all the wardrobe sections ready? Is the clothing chosen from the wardrobe according to the weather appropriate?
- **Evaluation**: Is "clothing bot" fast and economical enough?

APPROACH 1
· **Classify clothes first.**
· **Check the weather.**
· **Insert clothes into the wardrobe according to the weather.**
· **Every day, choose clothes from the appropriate section of the wardrobe.**

APPROACH 2
· **Check the weather.**
· **Classify clothes according to the weather.**
· **Insert clothes into the wardrobe according to the weather.**
· **Every day, choose clothes from the appropriate section of the wardrobe**

QUESTIONS
· **Main question: Should we classify clothes first or check the weather?**
· **Which clothes should we choose for the day?**
· **It is necessary to decide on the types of clothes!**
· **How will the wardrobe compartments be arranged?**
· **By the weather or by the type of clothing?**

Now, it is your turn.

Let's repeat and use what you learned.

Use Worksheet 2

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MODULE 2

Computational Thinking with Block-Based and Text-Based Coding Environments

EARLY

MODULE 2 – SESSION 1

The development of pre-school children and the potential for developing computational thinking

LESSON PLAN

Learning gains

Gain knowledge and understanding of computational thinking.

Understand what computational thinking is in preschool education.

Gain knowledge of the cognitive abilities of a child in preschool.

Have the ability to apply the knowledge acquired to promote the development of computational thinking in preschool.

Time

1.5 hours

Methods and techniques

Individual work

Group work – peer collaboration

Frontal work

Practical activities

Discussion, mind map, brainstorm

Resources, tools, and equipment

Presentation

Lesson plans

Handbook

Handouts

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LESSON PLAN

Video

Padlet

Jamboard

Google Forms

Next topic/lesson

Module 2 – Session 2: Difference between block-based coding and text coding

Implementation of the Lesson

Introduction

Gaining attention

The teacher offers a warm-up activity: each student has to write down the exact instructions on how to make a fried cheese bread (this could be any other activity consisting of several actions or steps).

Motivation

To be motivated to learn the content of this course, each student needs to understand the relevance of the topic in the context of our times. Here the teacher invites a discussion – what are the skills of a competitive citizen in today's modern labour market? Will these skills change in 20 years? What are they likely to be in 20 years' time? (A mind map on the board.)

Statement of the learning gains

The teacher invites everyone to recall the warm-up activity at the beginning of the lesson, which required a detailed description of the steps to be taken, and to share their work. The rest of the class should listen carefully and think about whether any steps have been skipped and whether the result will be achieved successfully. Inspirational video that can also be shown to students at the end: Video "EXACT INSTRUCTIONS CHALLENGE"

The lecturer explains that the warm-up activity is one of the ways in which we can look at the theme of the day, which is computational thinking. Therefore, today's objectives are to:

1. Gain knowledge and understanding of computational thinking.
2. Understand what computational thinking is in preschool education.
3. Gain knowledge of the cognitive abilities of a child in preschool.
4. Have the ability to apply the knowledge acquired to promote the development of computational thinking in preschool.

Development

Implementation of the lesson core

The lecture starts with an overview of the theoretical background – the content can be found in the presentation as well as in the Module 2 curriculum and teacher's handbook. *(Approximate time 40 minutes)*

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The online task "Let's play around a bit!" – students create an algorithm for baking pancakes.

In the presentation slide "What can help develop computational thinking?" students suggest activities/games that they think contribute to the development of computational thinking. In pairs/groups they analyse their answers – will this activity promote all the steps of computational thinking? (Approximate time 15 minutes)

The online task "Let's play around a bit!" – a simulation of the educational robot Bee-Bot. Students' task is to create an activity for preschool students with this website.

After the presentation slide "Cognitive development in preschool" – exploratory work in groups to create a small infographic – what are the most important things to consider when designing a technology-enhanced lesson in pre-school? (Approximate time 20 minutes)

The main part of the lesson concludes with **the presentation slide "What activities are suited to the preschool age group?"**

Conclusion

Summarizing

Each student writes down 3 new insights from today's lesson (possibly verbally or in writing (e.g., on *Padlet* or *Jamboard*)).

Homework

Review 1-3 different studies on computational thinking in preschool and prepare the most relevant/interesting theses.

Re-motivating (What will it do in real life?)

The lecturer offers quotes from national pre-school education guidelines, laws, regulations and research to highlight the importance of developing different technology skills from the preschool age.

Evaluation or testing

A short test in *Google Forms* consisting of the following questions and multiple choice answers:

- How would you describe computational thinking?
- What are the four steps of computational thinking?
- How to promote computational thinking in preschool?
- What are the key developmental features to consider when preparing a lesson for preschool children?

End

The lecturer thanks the students for their diligent and hard work. Goodbye to the students.

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HANDOUT

Computational Thinking with Block-Based and Text-Based Coding Environments

1. Potential for developing computational thinking (CT)

- Jeannette Marie Wing, a professor of computer science, defines the concept of CT as the thought processes involved in seeing and formulating problems and their solutions, followed by a solution by a human, a machine or a combination of a human and a machine (Wing, 2011). In the context of the preschool educational level, the term CT can be seen as the skills of logical thinking, observation of patterns and parallels, as well as problem spotting, dissection and solving, where actions are logically, sequentially, successively planned to reach the solution of the task.
- According to the development of preschool learners, at the age of five, the child's brain has reached about 80% of the weight of an adult brain, has significantly improved eye focusing abilities, and control over his/her small and large motor skills, which is evidence of brain maturation (Baumgarten, 2003). Alongside physical development, cognitive processes are also developing: language skills, concentration, memory, a rapidly expanding vocabulary, the ability to see and understand symbols and to use the imagination have all been developed (Baumgarten, 2003). At this age, children are able to imitate an action, imagine a situation, fantasize. These parts of the development of the thinking process suggest that children at this age are able to work with technology in appropriate contexts and environments, but the specificity of cognitive processes at this age should also be taken into account, which implies that a large proportion of 5 year olds have: “difficulty in seeing more than one aspect of an object, which is called centrism; difficulty in understanding another's perspective: egocentrism; attribution of personality to inanimate objects: animism; the belief that fantasy is the same as reality” (Baumgarten, 2003). At the age of 6-7, children move into the stage of concrete operations (Piaget, 1964), where logical thinking, understanding of mathematical

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concepts, the ability to see causal relationships, and the ability to understand peers, to put oneself in their shoes (egocentrism) begin to emerge (Baumgarten, 2003).

- The apps and educational robots give preschool students the opportunity to develop and improve their skills not only in block programming, but also in seeing, formulating and breaking down a problem (into steps, stages), as well as their skills in making connections between similar problems and previous experiences (computational thinking).

2. Difference between block-based coding and text coding

Block-based coding	Text coding
It is: · **Visual** · **Syntax-free** · **Block-based** The block-based approach of visual programming is by no means a new idea but initial implementations lacked technical means to make its usage in a correct way. It has just become popular in recent years due to the appearance of new generation tools like Scratch, Blockly, and Snap. The idea is to create a code in a way that is both visual (simple) and similar to traditional text-based coding (powerful). All the developer has to do is to connect visual "building blocks" in a logical way. This approach became predominant in introducing kids to programming and is used all over the world now.	Text-based coding involves writing lines of code and can be introduced to kids after they get used to block-based coding. Text-based coding is essentially typing instructions in a programming language following a syntax. Syntax is the grammar and spelling rules of a programming language (Priyanka, 2021). Programming languages provide the rules for building websites, apps, and other computer-based technologies (McGee, 2022). A programming language that does not involve graphical elements (blocks) as a main part of its programming language, but instead is mostly oriented around text (Giannakoulas, 2020).

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Block-based and visual code editors use a drag-and-drop approach that makes it easier than ever for students and teachers to enter the world of programming. Unlike traditional, text-only programming, block-based programming requires little prior knowledge, training, or setup, making it accessible to students and teachers at the beginner level and beyond (Codio, 2023).	Switch in coding environment from Block-based to Text-Based Coding – making the connection, and allow your students to translate their block code into either Python or JavaScript text-based code.

3. The development of CT with the help of apps

CT can be introduced to preschool children through various apps that use playful, interactive approaches to help develop their problem-solving, pattern recognition, and logical thinking skills. Here are some examples of apps that can be used to introduce preschool children to CT:

- **ScratchJr:** ScratchJr is a simplified version of Scratch designed for children aged 5-7 years. The app allows children to create simple animations and interactive stories by snapping together graphical programming blocks. ScratchJr is designed to be easy to use, with a drag-and-drop interface that allows children to create their own programs by selecting and arranging commands.
- **Kodable:** Kodable is an app designed to teach young children the basics of coding through a series of games and activities. Children learn to recognize patterns, develop problem-solving skills, and think logically as they navigate through the app's challenges.
- Daisy the Dinosaur: Daisy the Dinosaur is an app that teaches children the basics of programming through a series of interactive challenges. The app features a simple drag-and-drop interface that allows children to create their own programs by snapping together commands and actions.
- **Tynker Junior:** Tynker Junior is an app designed to introduce young children to the basics of coding through a series of fun, interactive challenges. Children learn to develop their problem-solving skills, think logically, and recognize patterns as they work their way through the app's activities.

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- **Hopscotch:** Hopscotch is an app that allows children to create their own interactive games and animations by snapping together code blocks. The app features a drag-and-drop interface that makes it easy for children to create their own programs, while also helping them develop their logical thinking and problem-solving skills.

By engaging children in hands-on activities and challenges, these apps can help lay the foundation for future learning in computer science and other technology-related fields.

4. The development of CT with the help of educational robots

Educational robotics in pre-school is not primarily aimed at teaching children to code or learn to solve technical problems, but rather as a kind of playground that provides additional opportunities to express, participate, communicate and learn about technology, where problem-solving skills play an increasingly important but secondary role (Odgaard, 2022). The idea is thus put forward that technology is one form of communication or an assistant in this process of learning to communicate and collaborate.

Diverse approaches to learning mean pursuing the same goals through different pathways, i.e., using a variety of approaches. For example, games have already provided basic knowledge about directions, sequencing, etc. Also, the skills learnt in robotics lessons can be practiced in advance with other technological solutions such as apps.

The visualization of actions plays an important role in the inclusion of educational robots in pre-school education, where children have the opportunity to first draw or place their planned programming actions, for example, using the robot's action cards. Such visualization helps both to structure and review their planned programming path and to look for a bug in the solution later on, if one occurs. Research also highlights the importance of individual support from the teacher (Kyriakoula & Charoula, 2019). In addition to individual support, task succession should be observed, where a task goes from easier to more complex. For example, in a session with an educational robot, children may be invited to initially draw the path on paper, subsequently plan it with the help of direction cards, and in the next phase program the robot to perform the actions without aids. And at the last preschool level, use block programming to control the educational robot.

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5. School teaching materials – lesson plans and pre/post assessment

When starting technology-enhanced activities in preschool, especially for educational robots, it is essential to first create in the learners the awareness that humans communicate with computers in a "language" of symbols, where each instruction has to be specific, precise, sequential in order to achieve the desired result (Saxena et al., 2020).

The basic principles of a technology-enhanced lesson are the same as for any purposefully planned lesson, for example, using Gagné's nine learning events model for effective lesson. At the same time, it is important to remember a few basic conditions for designing lessons and activities:

- the activity is in the form of a game/play,
- activities should be fun/entertaining,
- clear objectives for the teacher to incorporate the technology and clear tasks for the children,
- easy-to-use, understandable technology chosen for interaction,
- regularity and structure in the task conditions,
- tasks are adjusted to the level of difficulty,
- a sense of achievement that motivates children,
- tasks include a challenging, problem-solving aspect,
- social interaction with peers,
- a common theme/story as the background for the whole activity (Lin et al., 2020).

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MODULE 2 – SESSION 2

Difference between block-based coding and text coding

LESSON PLAN

Learning gains

The ability to identify elements and differences of block-based coding and text coding.

Understand what form of programming is appropriate for preschool age children.

Time

1.5 hours

Methods and techniques

Individual work

Frontal work

Exploratory activities

Discussion

Resources, tools, and equipment

Presentation

Computer or tablet

Previous topic/lesson

Module 2 – Session 1: The development of pre-school children and the potential for developing computational thinking

Prerequisites (knowledge, skills, etc.)

Topic 1 is completed:

- "The development of pre-school children and the potential for developing computational thinking"

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LESSON PLAN

Next topic/lesson

Module 2 – Session 3: The development of computational thinking with the help of apps

Implementation of the Lesson

Introduction

Gaining attention

The teacher offers a warm-up activity: **short discussion** – What is the difference between block-based and text-based coding?

Motivation

To be motivated to learn the content of this topic, each student needs to understand that by using block-based coding, both students and teachers can benefit from a more approachable and interactive learning experience, fostering creativity, problem-solving skills, and logical thinking in young learners.

Statement of the learning gains

Yes, block-based coding is indeed designed to be accessible and user-friendly, making it suitable for learners of all ages, including preschool children. The visual blocks used in block-based coding allow young children to understand and interact with programming concepts in a more intuitive way. By arranging and stacking these blocks, even young learners can create simple programs and animations. Teachers often incorporate block-based coding into their curriculum as an introductory tool for teaching programming. The visual nature of block-based coding makes it easier for teachers to explain programming concepts and engage students in hands-on activities.

Questions answered in this topic:

What is block-based coding?

What is a block-based coding environment?

Why block-based Coding?

Most popular block-based environments

Development

Implementation of the lesson core

The lecture starts with an overview of the theoretical background – the content can be found in the presentation as well as in the Module 2 curriculum and teacher's handbook. *(Approximate time 40 minutes)*

Theoretical base What is block-based coding and environment?
Theoretical base What is text-based coding and environment?

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Conclusion

Summarizing

Understanding the difference between block-based and text-based coding empowers teachers to choose the most appropriate approach based on their students' needs and abilities. It allows teachers to provide a supportive learning environment, scaffold students' understanding, and guide them towards becoming proficient programmers.

Homework

Review and try out block-based links provided in this module.

Re-motivating (What will it do in real life?)

Block-based coding is the most popular way of starting to learn coding or robotics at an early age.

Evaluation or testing

A short test in *Google Forms (or other)* consisting of the following questions and multiple choice answers:

- How would you describe block-based coding?
- Block-based coding and text-based coding are two different approaches to writing computer programs. Name two or more key elements for both.
- Is block-based coding suitable in preschool?

End

The lecturer thanks the students for their diligent and hard work. Goodbye to the students.

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MODULE 2 – SESSION 3

The development of computational thinking with the help of apps

LESSON PLAN

Learning gains

The ability to determine the most appropriate exercises for development of CT with the help of apps.

Time

1.5 hours

Methods and techniques

Individual work

Frontal work

Practical activities

Discussion

Resources, tools, and equipment

Presentation

Lesson plans

Handouts (links to the materials are included in presentation)

Tablets

Previous topic/lesson

Module 2 – Session 2: Difference between block-based coding and text coding

Prerequisites (knowledge, skills, etc.)

Topics 1-2 are completed:

- "The development of pre-school children and the potential for developing computational thinking",
- "Difference between block-based coding and text coding".

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LESSON PLAN

Next topic/lesson

Module 2 – Session 4: The development of computational thinking with the help of educational robots

Implementation of the Lesson

Introduction

Gaining attention

Reminder of the meaning of CT – Computational thinking is the process of breaking down complex problems into smaller, more manageable parts, identifying patterns and relationships, and developing algorithms and solutions that can be executed using computers.

Motivation

Here are some examples of apps that can be used to introduce preschool children to computational thinking (follows slides with examples).

Reviewing previous lesson

Computational thinking can be introduced to preschool children through various apps that use playful, interactive approaches to help develop their problem-solving, pattern recognition, and logical thinking skills.

Block-based coding is the most popular way of starting to learn coding or robotics at an early age.

Statement of the learning gains

- There are many preschool apps available that aim to develop computational thinking skills in young children. It's difficult to give an exact number as the list of such apps is constantly changing and growing.
- These apps use different approaches to teach computational thinking skills, ranging from block-based programming to game-based challenges.

Development

Implementation of the lesson core

Practical lesson with ScratchJrapp. It is an introductory programming language that enables young children (ages 5-7) to create their own interactive stories and games.

Follow information in presentation slides:

- What is ScratchJr?
- How to start ScratchJr?
- Learn interface of Scratch Jr.
- Play with Scratch Jr.
- ScratchJr Connect
- ScratchJr in Youtube

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LESSON PLAN

Conclusion

Short discussion:

Do you feel prepared to design classes using ScratchJr's block-based coding?

Summarizing

- Discover how to use the application with knowing the possibilities of the coding apps.
- It's crucial to remember that while these apps can be excellent resources for fostering computational thinking abilities, young children shouldn't rely solely on them for their educational needs.
- For a child's entire development, a balanced approach that incorporates other activities, such as physical play and social engagement, is equally crucial.

Homework

Study and implement the apps offered in this module.

End

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MODULE 2 – SESSION 4

The development of computational thinking with the help of educational robots

LESSON PLAN

Learning gains

Understands the contribution of educational robotics in preschool education.

Knows what to consider when planning lessons with an educational robot.

The ability to determine the most appropriate exercises for development of CT with the help of educational robots.

Hands-on experience with different robots suitable for preschool education.

Time

1.5 hours x 2*

*This topic consists of two lectures – theory and practical work.

Methods and techniques

Group work – peer collaboration

Individual work

Frontal work

Practical activities

Discussion – mind map

Resources, tools, and equipment

Presentation

Lesson plans

Different educational robots suitable for preschool age, such as:

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- Photon
- Bee-Bot
- Code & Go Robot Mouse
- Makeblock mTiny-Panda bear
- Glow and Go Bot
- TTS rugged robot
- Sphero Indi lasterbot
- and others

Trips and observations

Observing a real lesson (involving coding) in a preschool.

Previous topic/lesson

Module 2 – Session 3: The development of computational thinking with the help of apps

Prerequisites (knowledge, skills, etc.)

Topics 1-3 are completed:

- "The development of pre-school children and the potential for developing computational thinking",
- "Difference between block-based coding and text coding",
- "The development of computational thinking with the help of apps".

Next topic/lesson

Module 2 – Session 5: School Teaching Materials – lesson plans and pre/post assessment

Implementation of the Lesson

Introduction

Gaining attention

The lecturer invites everyone to write on a virtual mind map (Padlet/Jamboard) – what do you think a robot is?

Motivation

Students are invited to express their views in a discussion on "Robots – benefit or threat?"

Reviewing previous lesson

The lecturer invites everyone to recall the topic covered in the previous lecture – The development of computational thinking with the help of apps. Which is followed by the question, what could be the vision and what could be the contribution of robotics to preschool education?

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LESSON PLAN

Statement of the learning gains

The lecturer outlines that the day's lesson will be divided into two parts (theory and practice) in order to achieve the following objectives:

1. Understands the contribution of educational robotics to preschool education.
2. Knows what to consider when planning lessons with an educational robot.
3. The ability to determine the most appropriate exercises for development of CT with the help of educational robots.
4. Hands-on experience with different robots suitable for preschool education.

Development

Implementation of the lesson core

Theoretical Input

Students are asked to find in groups the Three Laws of Robotics by Isaac Asimov. Each group should read these laws, discuss them and see if any more laws of robotics should be added in a modern (education) context. (Approximate time 10 minutes)

Short video Robotics in education (2 minutes)

The lecture starts with an overview of the theoretical background – the content can be found in the presentation as well as in the Module 2 curriculum and teacher's handbook. (Approximate time 30 minutes)

Practical work

Students are invited to try out different educational robots and complete attached tasks.

Different educational robots suitable for preschool age, such as:

- Photon
- Bee-Bot
- Code & Go Robot Mouse
- Makeblock mTiny-Panda bear
- Glow and Go Bot
- TTS rugged robot
- Sphero Indi lasterbot
- and others

Hands-on work with educational robots gives students the opportunity to get to know what these robots are like, their controllability, functions, attached tasks and to imagine a potential lesson in a preschool with them.

Conclusion

Summarizing

By looking at the possibilities of robotics from both a theoretical and practical perspective, students are invited to share their vision of the value of robots in preschool and where they can be integrated.

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LESSON PLAN

Homework

Design a lesson plan including an educational robot – topic, subject and age group of their choice.

Closing the lesson implementation

The lecturer points out that all our daily activities and steps are in close contact with technology, so it is valuable to introduce children to the possibilities, limitations, controls, etc. of technology from an early age through games and play.

End

The lecturer thanks the students for their diligent and hard work. Goodbyes to the students.

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MODULE 2 – SESSION 5

School Teaching Materials – lesson plans and pre/post assessment

LESSON PLAN

Learning gains

The ability to develop teaching materials and lesson plans.

Ability to plan and organise evaluations.

Time

1.5 hours

Methods and techniques

Individual work

Frontal work

Practical activities

Discussion

Resources, tools, and equipment

Presentation

Lesson plans

Handouts

Previous topic/lesson

Module 2 – Session 4: The development of computational thinking with the help of educational robots

Prerequisites (knowledge, skills, etc.)

Topics 1-4 are completed:

- "The development of pre-school children and the potential for developing computational thinking",

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- "Difference between block-based coding and text coding",
- "The development of computational thinking with the help of educational robots",
- "The development of computational thinking with the help of apps".

Implementation of the Lesson

Introduction

Gaining attention

Introductory question to encourage conversation:

What do you think should be in a successful lesson?

Motivation + Reviewing previous lesson + Statement of the learning gains

In the previous lesson, students had homework – to create a lesson draft/idea sketch including an educational robot – topic, subject and age group of their choice.

This session will help students learn how to plan a successful technology-enhanced lesson.

Development

Implementation of the lesson core

The lecture continues with an overview of the theoretical background – the content can be found in the presentation as well as in the Module 2 curriculum and teacher's handbook. *(Approximate time 15 minutes)*

First, everyone works together to study the lesson plan template available in the lecture materials – finding out what sections are needed in a quality lesson plan. Then, everyone shares their experience of what they had already been planning, but what still needs to be thought about (homework).

The online task *"Let's create a plan!"* *– Each individual improves on the idea that he/she has already prepared, creating a lesson plan in the offered online google doc. (Approximate time 20 minutes)*

After completing the lesson plan – everyone is asked to fill in a checklist (can be found in the presentation as well) about their work. *(Approximate time 15 minutes)*

Students are invited to share what they have done and to reflect on their work by answering the following questions:

- How did I do overall?
- What do I need to improve?
- What did I learn today?

(Approximate time 10 minutes)

The final topic is evaluation. Stimulating questions:

- what is being evaluated?
- why is that necessary?
- who gains from it?

In the presentation slide "Assessment" students get the idea that assessment can be for both – the teacher and the children. As well as gaining an understanding of the types of assessment in preschool and the benefits of self-assessment & child assessment.

Conclusion

Summarizing

Students create a summary of the lesson by answering the question *"What did I learn today?"*.

Re-motivating (What will it do in real life?) + Closing the lesson implementation

The lecturer reminds them that:

- it is as important as coming up with an interesting activity as to carefully plan the lesson,
- and that it is just as important as planning the lesson to evaluate what you as the teacher and the children have gained.

Evaluation or testing

Final assessment for the entire course:

- Open-ended question and answer format.
- Online environment – *google forms*.
- Preparation of a lesson plan for a freely chosen topic and age group, with the condition that the promotion of computational thinking through coding must be integrated.

End

The lecturer thanks the students for their diligent and hard work. Goodbyes to the students.

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MODULE 2 – SESSION 5

WORKSHEET

The online task "Let's create a plan!"

_____

Name and surname

In the previous session, you were given homework in which you each created a draft/idea sketch for your lesson, including an educational robot or one of the apps that offer block programming.

Task 1

In small groups, study the lesson plan template available in the lecture material – identifying the sections needed for a good lesson plan.

Task 2

Each individual develops his/her prepared idea (homework) by creating a lesson plan in the provided online google doc (Approximate time 20 minutes).

Introduction	Gaining attention	
	Informing the learner of the objective	
	Stimulate recall of prior learning	

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WORKSHEET

Development	Presenting information	
	Provide guidance	
	Elicit performance	
	Provide feedback	
Conclusion	Assess performance	
	Enhance Retention and Transfer	

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MODULE 2

TEST

Computational Thinking with Block-Based and Text-Based Coding Environments

(Text document that can be used to insert content in any other format.)

Name and surname: _____

Course: _____

Today is (date): _____

What is computational thinking?

_____

_____

_____

Which is the correct sequence for computational thinking steps?

- Decomposition, Pattern recognition, Abstraction, Algorithms
- Decomposition, Pattern recognition, Algorithms, Abstraction
- Pattern recognition, Decomposition, Abstraction, Algorithms
- Abstraction, Algorithms, Decomposition, Pattern recognition

Which of these activities can contribute to the development of algorithmic thinking?

- Robotics
- Treasure Hunt game
- Storytelling
- Writing instructions (step by step)
- Painting
- Coding apps

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TEST

Activities suitable for preschool age – *Which statement is wrong?*

- simple to access
- visual images – calm tones, low intensity brightness, lots of images
- aim – can be achieved in a short time
- activities – sufficiently limited
- feedback – immediate

Please complete the sentence:

_____ ***code editors use a drag-and-drop approach.***

- Block-based
- Text

Please complete the sentence:

The main goal of visual programming is to make programming _____ .

- more interesting and more colourful
- more accessible to learners from a young age
- about the opportunity to learn how to write code

Which is the definition of the concept of "simulation"?

- Visual programming languages may include visual mechanisms to bring the program in a particular state and check its behaviour.
- Usage of meta-information to document and explain the program.
- The use of block/icons, diagrams, and forms to eliminate syntactic errors.

Please complete the sentence:

_____ ***involves writing lines of code. It is essentially typing instructions in a programming language following a syntax.***

- Block-based coding
- Text-based coding

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TEST

What is the main barrier to starting to learn text-based programming at preschool age?

_____

Which statement is wrong?

- It is difficult to integrate other learning areas into educational robotics lessons.
- Educational robotics can develop creative and logical thinking.
- Educational robotics can develop problem solving skills.
- Educational robotics can promote the acquisition of programming skills.

At what age is it most appropriate to start introducing educational robots to preschool children (in most cases, taking into account the individual development and experience of the learners)**?**

- 1-2 years old
- 2-3 years old
- 3-4 years old
- 4-5 years old

Which question is the most important for the teacher to answer before planning a technology-enhanced lesson?

- What will be the topic?
- How much time will this lesson take?
- What will children learn and how?
- What resources, tools and equipment are needed?

Thank you for your time and answers!

We will try to provide feedback as soon as possible!

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MODULE 3

Fundamentals of Physical Programming and CT with Robotic Activities

MODULE 3 – SESSION 1

Fundamentals of Physical Programming and Robotics

LESSON PLAN

Learning gains

The participants can explain the connection between human sensing and electronic sensors.

The participants can describe different forms of electronic sensors and the specific measurements these sensors take as input.

Time

3 hours

Methods and techniques

Presentation

Think-Pair-Share

Discussion

Homework

Resources, tools, and equipment

Introduction: Presentation slides + Beamer

Discussion: Paper+Pencil, Notebook, digital text file

Homework: Worksheet

Trips and observations

The homework can be done as a self-organised observation in the real world.

Prerequisites (knowledge, skills, etc.)

Going through modules 1 + 2 of the course are recommended, but not a necessary requirement.

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LESSON PLAN

Next topic/lesson

Module 3 – Session 2: Physical Programming and Robotics in Practice

Implementation of the Lesson

Introduction

Gaining attention

Start the lesson by showing different representations of tools, machines and robots (e.g., videos, pictures, newspaper articles). Start a short discussion about the use of tools, machines and robots, when was the last time the students used a tool, a machine or a robot, and why did they use them?

Motivation

From the real-world examples by the students, underline the importance of tools, machines and robots in modern society. Demonstrate and discuss the differences between tools, machines and robots. Focus on robots as machines which are guided by programming/code/a computer chip and are used to perform human-like tasks. Present different types of those robots and go into a quick question round about which tasks these robots do.

Statement of the learning gains

In this lesson, the students will learn basic principles of how robots interact with their environment, focusing on sensors and human senses.

Development

Implementation of the lesson core

Introduce the students to basic human senses. Show them different objects (e.g. an apple, a dice, a light bulb) and ask them to describe those objects. Which of their senses are being used by humans to capture the properties of their surroundings and the traits of objects? [Use Worksheet 1]

Form teams of two and let the students exchange their ideas. Afterwards, let them read through the Wikipedia article for sense [e.g., https://en.wikipedia.org/wiki/Sense] or let them do a quick online research on the topic. After reading, the students can make additions and changes to their worksheet.

Bring everybody back together and let them discuss their findings. Compare the examples the students chose for the senses and reflect whether they are correct or not. If you are able to, decide on prime examples for the different senses.

From these examples, collectively find examples where machines use senses. How do machines and robots specifically gather information? Show a video which explains different types of sensors [e.g., https://www.youtube.com/watch?v=J_KoRp8SnoE]. Pause the videos after each sensor and decide which human sense it belongs to. Add the answers to Worksheet 1, together with the examples from the video.

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Conclusion

Summarizing

Robots are everywhere around us. They use sensors to gather information about their surroundings, just like humans do. It is important to understand how they perceive their environment if we want to program a robot to act according to his purpose.

Homework

For the next lesson, write down the different types of robots you come in contact with during your daily life. What is their job? Which type of sensors do they use? What do those sensors measure? What is done with the information? How do the robots react given different measurements? [Use Worksheet 2]

Evaluation or testing

Check/discuss homework papers at the beginning of the next session.

End

End the lesson.

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WORKSHEET 1

Human Senses and Robot Sensors

Human Sense	Measurement + Examples	Sensor	Measurement + Examples
Vision			
Touch			
Smell			

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WORKSHEET 1

Hearing			
Taste			
Sense of Space (Proprioception)			

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WORKSHEET 2

Robots in Daily Life

Discover the robots surrounding you in your daily life.

Write down a short description of their job, the type of sensors they use and what does sensors measure. How do the robots react to different information? How would a human do the same job?

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MODULE 3 – SESSION 2

Physical Programming and Robotics in Practice

LESSON PLAN

Learning gains

The participants can sketch basic algorithms that combine sensor input with robotic actions.

The participants can analyse which sensor is being used in everyday objects.

The participants investigate the synergy between different sensors used in everyday objects by decomposing real life applications.

Time

3 hours

Methods and techniques

Presentation

Team/Class exercise

Resources, tools, and equipment

Introduction: Presentation slides + Beamer

Group Work: Paper + Pencil, Notebook, digital text file

A big room in which people can freely move around in is helpful for the lesson, you should be able to use tape on the floor

Different materials which can work as sensors/senses

Floor-Map

Previous topic/lesson

Module 3 – Session 1: Fundamentals of Physical Programming and Robotics

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LESSON PLAN

Prerequisites (knowledge, skills, etc.)

Going through modules 1 + 2 of the course are recommended, but not a necessary requirement.

Implementation of the Lesson

Introduction

Gaining attention

Do a short recap on the last lesson [Module 3 – Session 1]. What were the main findings in the last session? Are there any more questions? How did the homework go?

Motivation

In the last session, the students were introduced to human senses and robot sensors. This basic knowledge is being used to learn about sensor input and robot programming.

Statement of the learning gains

In this lesson, the students will learn basic ways to program a robot, focusing on the connection between sensors, inputs and decisions made based on sensor input.

Development

Implementation of the lesson core

At the start/before the lesson prepare a floor-map and tape it to the ground. The size should be chosen according to the available space, but each tile should be big enough for a person to stand on (roughly 30cm times 30cm) and should have 5 tiles on each side.

				E
S				

This floor-map will be used as the base layer for the lesson. The main task is to get from S(tart) to E(nd), using different senses/sensors. A simple example is shown below:

o	o	o	o	E
o	o	w	w	w
o	o	w	o	o
o	o	w	o	o
S	w	w	o	o

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Each w represents a glass of warm water. Each o represents a glass of cold water. The students know that the water has different temperatures. A student stands on the starting field. Together with his colleagues the student is going through the process of finding the right way by touching the glass or touching the water to navigate the way to the end.

This very basic example can then be repeated and adapted using different senses (e.g., small LED lights, different shapes, different tastes of fruits e.g.). Further adaptation can be done by extending the floor map, changing its form, putting obstacles on the course, and combining multiple sensors. In each step, students should describe how a robot would work and which sensor would be needed. The students transcribe the robot movements and the sensor inputs into a simple flow-chart. [Advanced version: Students are writing simple if/else statements, refer to Module 1].

Discuss if and how a similar game could be played with young children [refer to Module.

Conclusion

Summarizing

The basics of robot sensors can be taught through games. It is important to show that simple robots are bound to the conceptual boundaries that humans program into the machine. The existing educational robots and their basic controls should be taught before advancing to the sensor level [refer to Module 2].

Homework

Students should conceptualise their own ideas on how to use this game or a similar game with young children. Which sensors would they like to use?

Evaluation or testing

Collect the homework assignment and give written feedback on the ideas. Publish the idea on a digital platform so the students can share and discuss the ideas.

End

[If planned, give an outlook to Module 4] End the lesson.

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MODULE 4

Designing Activities and Learning through Distance Education

MODULE 4 – SESSION 1

Introduction to distance education with children with focus on Robotics: concepts and challenges

LESSON PLAN

Learning gains

Discuss the main characteristics of distance education activities and how these differ from face-to-face teaching in Early Childhood Education.

Summarise the elements of distance teaching that need a different skill set to face-to-face teaching.

Design and evaluate activities and strategies for distance education in Early Childhood Education.

Time

3 hours – can be divided into 2 sections

Methods and techniques

Activity-based teaching method

Peer collaboration, station, cornering

Discussion techniques: (think, pair, share)

Practical activities

Group discussions

Group work: design and evaluate activities

Resources, tools, and equipment

Presentation

Lesson plans

Worksheets

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Videos

PREREQUISITES (KNOWLEDGE, SKILLS, ETC.)

This module follows on from previous modules – therefore it is recommended that participants have completed the 3 previous modules in the training as they will be using their completed lesson plans developed in the previous modules to adapt to online learning.

NEXT TOPIC/LESSON

Module 4 – Session 2: Designing and Evaluating Learning Experiences for Children

IMPLEMENTATION OF THE LESSON

INTRODUCTION

GAINING ATTENTION (10 MIN.)

Welcome to the participants.

Introduction to topic and Learning Objectives

Slides 1 - 3

Children and young people have engaged in remote learning at home either through paper-based materials provided by their setting or school, online learning materials or a combination of both.

Pre-school settings and schools are at various stages of devising safe, effective and efficient arrangements for their settings.

The planning for blended learning approaches is dependent on factors, such as: the number of staff and children and young people; the size and layout of the preschool setting or school; subject uptake; and, the availability of suitable teaching and learning spaces for each curriculum/subject area.

Challenges are now being faced by the sector on the mechanisms of remote learning and teaching

The pre-school curriculum is a holistic /play based curriculum that all children learn through discovery, investigation and imagination in collaboration with the staff and their peers. In the current circumstances, staff face challenges in the delivery of the Pre-School Curriculum and the implementation of a blended learning approach in the home learning environment. These challenges are non-specific to one curriculum area due to the interconnectedness of the six areas of learning and are common across the range of pre-school settings.

The challenges faced by staff in delivering the pre-school curriculum are all linked directly or indirectly to two key areas:

1. The tensions between adhering to current guidance to keep children physically safe, whilst maintaining a robust early year's pedagogy which allows young children to flourish

mentally, physically and emotionally thereby promoting positive dispositions and attitudes to their current and future learning; and

2. Managing and planning for a blended approach to the children's learning and development; combining their experiences within the setting and supporting the parents to build on this in the home learning environment.

Motivation + Reviewing previous lesson + Statement of the learning gains

In the previous lessons, students had to design lesson plans including an educational robot – topic, subject and age group of their choice. These completed lesson plans will be used in this session. Participants will adapt their face to face lesson planning to distance learning for preschool children

Development

Implementation of the lesson core

Section 1 (50 min.)

Opening Activity – Small Group Activity

Slides 4 - 8

Introductory question and activity to encourage conversation and for participants to use their own learning based on their individual experiences during the COVID-19 pandemic:

What does Distance Learning really mean?

For Teachers? For Parents? For children? (For you?)

After some time to discuss (10 minutes), ask participants to share ideas and show them slides 5 and 6 (10 minutes).

Basic Concepts

- Synchronous teaching
- Asynchronous teaching
- Blended/Hybrid Learning

Present the concepts (slides 10 to 14) by linking them to the participants experience both as teachers (if any) and students/learners. (10 minutes)

Small Group Activity about Challenges of DA in Early Childhood Education

Use Worksheet 1. each group is assigned/chooses which point of view (teachers/parents/children) wants to consider. Guarantee there is coverage and balance between groups. Explain the groups should look for challenges – aspects of ECE that make distance education challenging – but also reflect on good practices or principles to guide them. Three of each is enough per group as there will be a discussion afterwards.

After some time to discuss (10 minutes), ask participants to share ideas and register them in a board/flipchart. Afterwards show them slides 15 - 19 (15 minutes).

Trainer to select an Energiser from the list for 5 minutes. Slide 20

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LESSON PLAN

Section 2 (60 min.)

Planning distance education in ECE

Distribute guidance for lesson plan document and go through slides 22 - 24 for clarifying video calls, at-home activities and the need to combine them. (15 minutes)

Ask participants to think about the questions in task 1/slide 21 and invite some participants to share their ideas.

Show what is in the guidance – suggestions of activities to clarify the type of activity that can be used. Highlight the principles also present.

Present the items for the lesson plan Slide 25 and introduce the next activity. (10 minutes)

Small Group activity

Choose face to face lesson plans developed in previous modules and in small groups adapt these face to face lesson plans for distance learning remembering that **our focus is Distance and Face to Face Learning Reinforced with Robotics**

Feedback and group discussion (30 minutes)

This activity will be continued in Module 4 – Session 2.

Conclusion

Homework

Homework from Module 4 – Session 1 is to continue to adapt their chosen completed lesson plans from previous modules to online learning ready for use in Module 4 – Session 2 (slide 26).

Re-motivating (What will it do in real life?) + Closing the lesson implementation

Slide 27

- Ideas / new thinking I want to remember from this module
- Unique learning point from today
- Describe one example where my learning from today in theory and/or practice will help inform my future practice.
- What will I do differently as a result of new learning?

End

Group are in a circle – throw the snowball (a crumpled piece of paper) to each other and say one word to describe how they are feeling at the end of the session.

Close – Goodbyes and thank you.

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WORKSHEET

Identify challenges and good practices of distance education for ECE

GROUP WILL FOCUS ON

☐ teachers/providers ☐ families/caregivers ☐ children's learning

CHALLENGES	GOOD PRACTICES

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ICEBREAKERS AND ENERGISERS

Snowballs	Scrunch paper into ball and throw to each other – say your name and 3 things about yourself
Truth or lie	Each person writes on a sticky label 3 things about themselves and puts on their jackets – one of which is untrue. Participants move around room and talks to others and tries to identify the false statement
Weather check	Each person describes how they feel in terms of weather – Facilitator goes first – e.g., Mist now clearing
Introduction in pairs	Spend a few minutes talking with each other and then the other person introduces you to the group
Scavenger hunt	Ahead of time make a culturally appropriate list of 5-10 characteristics – e.g., Find someone who: Was born the same month as you. Owns an iPad. Has a little sister. Likes football. Has a pet. Has walked (Local place of interest).
Human Knot	Group sits in a circle on the floor with legs towards the middle. They link hands with other people. However, they cannot link hands with the people beside them, nor can they give 2 hands to the same person. Then the group must stand up and untangle the knot without letting go.
Group Portrait	The facilitator writes the name of the workshop at the top of a FC page and then adds group portrait. Everyone is invited to come up, one by one, and to draw a symbol that expresses something about them, and then sign their name. Before going back to their seat, they explain to the group what the symbol means to them. When everyone is finished the facilitator draws a big circle around all the symbols and names and comments on the team (e.g., diversity, richness etc.)
Fruit salad	Everyone sits on a chair in a circle and 1 standing in the middle. The person in middle picks a feature e.g. everyone wearing glasses change places and they also go to sit down. Person without a seat calls out the next feature. And so it goes on for 6 or 7 turns.

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HANDOUT

Good practices in Early Childhood Education – guidance for lesson plans

Quality distance education preschool should be flexible, child-centred, and fun. A balance is needed between teacher-led group experiences and at-home activities for families/caregivers to set up on their own time.

- The first will usually be held over a video call synchronously. The teacher-led experiences can also be video-recorded and made accessible to children and families/caregivers. This way, it's possible to respect that families have different schedules that don't allow for synchronous earning as a group.
- The activities to be developed with the children will usually be planned for asynchronous learning led by families/caregivers. This is based on explicit support about the activity organised in a brief information sheet to be sent out.

All activities will require technological support (video calls, exchange of files, etc) and will benefit from being resourced with materials that support children's learning such as books, equipment, puzzles, and games. The focus is on engaging in activities and play experiences with the children.

The connection between the activities is established through regular communication between teachers and families/caregivers and children through a platform, or at least by email/social media. This allows exchanges before and after the activities, as well as sharing the result of the activities and feedback on that. A good platform will also allow children to interact with each other.

The feedback provided by the families/caregivers to the teachers is essential to improve the quality of the experience (activities aligned with children's interests, for example) but also to allow the evaluation of the children for educational purposes.

Teacher-led distance sessions

Video calls can be effective with younger children if they are brief and playful, much like in-person large-group activities (Fenmachi, & Edah, 2022). The video calls can include sing-alongs, dance parties, or exercise activities for the whole group but video conferencing can

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also be used to connect small groups of children and teachers for show-and-tell or story time.

From the experiences gathered in the last few years, some dimensions have been highlighted as crucial in preparing quality experiences.

On communication: arranging with families/caregivers ahead of time how video calls will work and what tools will be used. This can guarantee that the needed software will be installed (support for it before the call might be needed). If possible, it will be helpful to have a short visual guide for the most used functionalities of the video call platform (emojis, hand-up, micro on/off, etc). After the sessions, asking for feedback and reflecting on the experience can support its improvement.

With good communication and planning, video calls can be prepared for large groups or smaller groups. Knowing how many participants and who will join can help teachers tailor their activities to the individual children ahead of time.

On technology: children will learn the basic functionality of whatever video platform is chosen, but it will take some time and practice. Similar to the beginning of the school year when the focus is on the basic classroom routines, the virtual classroom will require an introduction period. Prepare the families/caregivers for this adaptation so it will be smoother.

On materials/resources: it's good to have shared experiences between everyone but it will be difficult to guarantee everyone has the same items at home. Suggest generic resources (spoons, sheets of paper, pens, pans, books) with simple substitutes so each child can have a hands-on experience. Children don't need to have the exact same items to be able to draw, build, create patterns, and make music. The challenge presented can be to get creative with what families/caregivers and children have available at home (something to make noise with, something you like, ...).

On dynamic: the activities will be more successful if children are involved by having an active (and playful) participation. In large groups, this must work as a collective participation as it will be difficult to manage individual contributions from the children (answering questions, for example). It is best to avoid planning video lessons that require children to stay quiet or sit still for too long or that are focused on instruction or require children to wait for their turn to talk. Instead, preference should be given to activities where children are allowed to make noise and move around.

On mediation: the teacher will need to have an active role in mediating the conversation and managing participation in a virtual call – even more than in a physical setting where children can interact with each other more easily. Managing the focus of the video and

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microphones during the call can be a good way to help the mediation. One video on the screen is easier for children to follow. If children are to feel heard, the mics have to be on and the unstructured participation has to be welcomed and managed. Finally, feedbacking positively will be important to keep children engaged.

On time: Time management is also key: the synchronous moments need to be brief and have scarce periods without requests made to the children (while only the adult or a child speak).

On videorecording: if you record the session for families/caregivers to watch asynchronously, remember to still engage children actively and leave time for their participation. Also, remember to feedback (generically) after each request for participation.

Remember **general tips, tricks and troubleshooting** for synchronous distance education:

- arrange a neutral background that will not shift attention from you,
- the light source should be in front of you and be diffuse,
- the angle of the computer should be at your eye level,
- if you use visual aids (like ppt or video), turn it off every so often and talk on screen,
- make sure technology works for you and the families/caregivers and for the purposes needed,
- remember to purposefully plan your appearance and to use your body as a tool for engagement and focusing or directing attention.

TEACHER-LED DISTANCE SESSIONS – IDEAS FOR ADAPTING TRADITIONAL ACTIVITIES

Some activities that are common in physical settings can work in a virtual classroom. Here are examples from Brightwheel (blog.mybrightwheel.com).

Story time

Your best interactive read-alouds translate well to the virtual space, especially if you can use e-books that allow a full screen view of the pictures. An energetic reading with voices, open-ended questions, and prompts to guess what comes next will keep your preschoolers engaged, while also supporting important early literacy skills.

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Cooking projects

As opposed to cooking in person, a virtual cooking activity might feel a little like you're hosting your own cooking show. Create a visual recipe so your kids can follow along with the ingredients and steps. Invite them to mime what you're doing each step of the way and count along with you as you add ingredients. Describe how the texture changes at each step and give a close-up with the camera.

Song circles

Ideas for homemade musical instruments are truly endless. A paper towel roll can be a drumstick, a plastic bottle filled with rice can be a shaker, and a metal mixing bowl can be a drum. Encourage your little ones to get up and show you their dance moves on camera. The bonus of being in separate homes is kids have more room to themselves, and they won't be knocking into each other as they bounce, wiggle, move, and shake.

Slide show games

You likely have an arsenal of games you played at circle time in person. "What's Missing?" is a common example. In the in-person version of this game, you select 4-5 objects (those colourful rubber counters work well). After going over each object aloud ("We have a red bus, a yellow fire truck, an orange car, a green plane, and a purple helicopter,") you place a cloth over top to hide them. You then reach under to discreetly remove one object from the group. When you lift the cloth and reveal the remaining objects, the goal is to figure out which object you took away.

This could easily be recreated using a free online tool like Google Slides. Instead of the physical objects, you can use pictures of objects. Instead of hiding with a cloth and physically removing one of the items, you can change slides.

Virtual snack time

One of the most challenging things to replicate in the virtual space is the more casual social interaction that a typical preschool day allows. You may include snack time as part of your virtual time together. This can help reinforce a predictable schedule at home, while also giving your class some time to socialize. Depending on the size of your class, you may divide the snack times into smaller groups so that a conversation might be possible. You may want to bring some prompts or open-ended questions to seed the conversation.

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At-home activities

Children that are participating in distance education will have adults at-home (or in the same context) that are in a better position to develop activities with them. This will be a hands-on element that is needed to support learning. These activities are mostly prepared as asynchronous education by teachers.

For preparing at-home activities, teachers need to: rethink lesson plans, to make them families/caregivers friendly, prepare access to resources (online and offline), and have good communication with families/caregivers and children to be able to receive feedback about the activity after it has been experienced. This means families/caregivers communication is a top priority. The better informed they are about the expectations and purposes of the activities, the better they will be able to support the children (Dong, Cao, & Li, 2020).

The activities that are suggested need to take into consideration the context in which they will be developed (children's homes, hospitals, care facilities, etc.). This usually requires flexibility in terms of set-up and materials that are suggested. Clear guidance in terms of what is essential and what can be adapted makes it easier for families/caregivers to implement the suggested activity.

As discussed for the video calls, playfulness is important (O'Keeffe & McNally, 2021). Both for children and for families/caregivers, having joyful, creative, and bonding experiences will be essential. The ideas for play and learning activities that are provided will be part of what families/caregivers do with their young children, so they need to contribute to positive interactions. On the other hand, these activities will imply that families/ caregivers think and act like a teacher, therefore an important feature of any home learning idea is the clarification of the why/purpose behind the idea—what is a child learning in this activity?

AT-HOME ACTIVITIES – EXAMPLES

Some activities can be suggested for families/caregivers to incorporate into their daily routines; others will require more structure and preparation. Both require that their purpose and concepts are clarified and can benefit from tips for success.

Activities that can be articulated with **day-to-day life** will need flexibility since families/caregivers have their own way of organizing daily life. Some examples:

- Create buildings and/or cities out of cardboard boxes and empty containers. Who would live there?

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- Count how many footsteps it takes to get across the living room. Measure other distances inside the house, particularly the ones that are relevant for the child/ren. Measure distances outside the house, and on the street.
- Practice matching socks while doing the laundry. Besides the pairs of socks, this could lead to sets (by different colours, by different sizes). What is the most prevalent colour?
- When leaving the house, pay attention to the weather. What do we see? What do we feel?
- Go for a walk in your neighbourhood. Notice what is around you. Are there buildings? What colours? What shapes? What do they look like? What plants and animals do you see?
- Notice the patterns in the floors you walk on. Are they the same visually? And in terms of softness? What is the softest floor you walk on? And the hardest?
- Find items in your home that are all the same colour. How many green things can you find at home? Are they big or small? Is there any colour that has more big things than small?
- Go on a scavenger hunt for feelings: find examples of characters/people in magazines feeling sad, happy, scared, and angry. When do you feel those feelings? How do they make you feel?

Some activities that are common in preschool settings can work as **at-home activities**. Here are examples from Brightwheel (blog.mybrightwheel.com).

Sensory bins

There are a variety of ways to create a small sensory bin using rice, sand, flour, shaving cream, or soapy water, just to name a few. Give families a lot of options for how to make a sensory bin so it's accessible for all.

Sensory bins give children the opportunity to practice hand-eye coordination, build the hand strength necessary for holding a pencil, explore cause and effect, and practice self-regulation.

Recipes for play dough, gloop, or floam

There are several recipes to make homemade doughs. The first activity can be following the recipe, and then you can share a series of activities that make use of the result.

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Sample play dough activities

Hidden gems: Hide marbles or other small items in play dough for your child to find.

Cutting play dough: Using scissors to cut play dough is great practice for manipulating scissors.

Play dough shapes: Draw shapes on paper and invite your child to use playdough to create the outline of the shape or fill it in entirely.

Pretend cooking play dough: Pull out a few kitchen items to play with the playdough (bowl, spoon, spatula, whisk, mixing cup, etc.) in a pretend cooking scenario.

Play dough develops the fine motor muscle control required for all sorts of activities from writing to buttoning your jacket to using a fork and knife, and even tying your shoes. It's also powerful for emotional regulation, giving kids a safe place to work through their feelings.

Ways to burn energy indoors

Share some suggestions for activities that help children use their energy in good ways, like making a playlist of favourite action songs, games that can be played with balloons, indoor obstacle courses, paper plate skating, etc.

Children require opportunities for big muscle play every day. Physical play improves attention and focus, quality of sleep, and overall health.

Sorting laundry

There are many activities you can suggest that connect to household chores and provide a way for the parent and child to work on something together. Sorting laundry is a prime example of this. Preschoolers can sort through clean clothes, match up socks, and help their parents while they're at it.

Sorting and comparing are foundational math skills. They give children the opportunity to explore relationships and attributes, as well as how rules apply to sets.

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Building with anything

If you're concerned your children don't have their own wooden blocks or legos at home, empty boxes, jars, and paper towel rolls can be turned into building materials. Encourage families to send you pictures of their children's creations.

Building with blocks allows for the natural exploration of all sorts of math concepts, including balance, symmetry, size, order, length, pattern, and weight. Blocks also allow for symbolic thought (i.e., this block is a phone).

ABC's and 123's

Without overwhelming parents, you can and should send along ideas for how to support early math and early literacy. Share rhyming games, reminders to set aside time every day for reading together, and conversation prompts for the dinner table to encourage literacy learning. For math, you can suggest cooking projects, shape walks, scavenger hunts, and block-building activities.

Technology and resources for distance education

Many learning apps and tools can facilitate learning exchanges and student engagement. Mentimeter, Padlet, Canva, Miro are just some of the endless tools that can provide children with new ways of working together and creatively online.

When using technology with children, some considerations are needed. Overall, teachers and families/caregivers have a responsibility to protect and empower children by helping them learn to ask questions and think critically about the technologies and media that is used. For a more detailed position, the National Association for the Education of Young Children and the Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College (2012) issued a joint statement whose **key messages** are:

4. When used intentionally and appropriately, technology and interactive media are effective tools to support learning and development.
5. Intentional use requires early childhood teachers and administrators to have information and resources regarding the nature of these tools and the implications of their use with children.
6. Limitations on the use of technology and media are important.

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7. Special consideration must be given to the use of technology with infants and toddlers.
8. Attention to digital citizenship and equitable access is essential.
9. Ongoing research and professional development are needed.

The Developmentally Appropriate Technology in Early Childhood (DATEC) project identified **seven general** principles for determining the effectiveness of ICT applications – or uses of ICT – in the early years, to help practitioners provide the best possible experiences (Siraj-Blatchford, & Siraj-Blatchford, 2000). These are still relevant today and can be used as a useful tool to evaluate software programs or other ICT applications and to consider while preparing distance education for children:

1. Ensure an educational purpose.
2. Encourage collaboration.
3. Integrate with other aspects of the curriculum.
4. Ensure the child is in control.
5. Choose applications that are transparent (i.e., their functions should be clearly defined and intuitive so the application can complete each task in a single operation).
6. Avoid applications containing violence or stereotyping.
7. Be aware of health and safety issues.

Teachers can decide which materials are most likely to help children achieve the learning goals outlined. Interactive materials make learning more interesting, practical, concrete, and appealing. Besides choosing resources for the activities suggested by teachers, it has proven useful to indicate apps and resources that are of good quality for parents/caregivers to explore on their own. Teachers can evaluate if some guidance for each suggestion will be helpful.

Some examples of play-based learning activities for children aged 3 to 10 by UNICEF can be found here:

https://www.unicef.org/northmacedonia/play-based-learning-activities-children-aged-3-10

More in line with the topics of this training, consider:

https://code.org/

https://www.botstem.eu/

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Lesson-plans

Lesson-plans will be the support for all this information. Different structures can be used but the following items should be answered (Soares, 2021):

1. General **purpose** of the activity to make sure it is perceived as valuable for learning. This might entail links to the curriculum if families/caregivers are interested and knowledgeable of the curricular guidance for preschool.
2. Basic information about **concepts** being focused on in the activity. This should be easy to skip if parents already feel confident in their knowledge of the concepts. But clarifying the concepts can be important for parents to know what to highlight in the activity.
3. Required **materials** for the activity and suggested **set-up** (space, materials arrangement, time, etc.). It's important to remember that families/caregivers do not always have access to the same toys and items at home so it is best to avoid planning activities that require supplies that would have to be purchased. Options like basic household items ensure equity and make it easier for families/caregivers to start developing the activities. This might also involve online resources – in which case clear guidance to use those resources is needed. Again, avoid resources that require a subscription.
4. **Guidance** for preparation and implementation. Families/caregivers will most likely have a short time for the activities so knowing what is required as preparation and having an overview of the whole process is essential. A step-by-step explanation, well prepared and focused on being explicit will be key. Also, guidance on what to avoid and what to guarantee is important for less-experienced families/caregivers. It's good to always consider the families/caregivers knowledge of the child/ren as a basis for necessary adaptations. This way, the flow of the activity will be better adapted to the specific child/ren.
5. **Tips** for success. When planning the activity, it is important to identify the essential of the activity in terms of children's engagement with the concepts and the dynamic being created. Sharing those key points will better support families/caregivers to develop the activity.
6. Clear expectations about what, where, and how to be **returned as result/product** of the activity to the teacher. Some activities will result in products that can be shared

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(drawings, videos, collages, etc) others will be immaterial. From the start, it is useful that families/caregivers know what is expected to be deliverable from the activity. This might be a short paragraph about the experience, a video of the child/ren reporting on their satisfaction/learning, or artifacts that were created.

7. **Follow-up** activities. If the experience is positive, families/caregivers might wish to extend or deepen the activity. Some suggestions for follow-up activities can support this. These might entail changing the materials, inverting the order of the steps, harder challenges, involving other people, etc.

USEFUL RESOURCES

The following websites present **tips** on distance education in Early Childhood Education that can be useful to think your proposal:

https://www.edutopia.org/article/7-tips-managing-distance-learning-preschool/

https://www.pre-kpages.com/top-tips-for-virtual-teaching-from-a-pre-k-teacher/

https://osse.dc.gov/sites/default/files/dc/sites/osse/service_content/attachments/Distance%20Learning%20for%20ECE.pdf

https://www.pre-kpages.com/distance-learning-how-to-engage-preschoolers/

Also, see these **examples** of combination between video calls and at-home activities:

https://www.notimeforflashcards.com/2020/07/distance-learning-lesson-plan-for-preschool.html

https://www.notimeforflashcards.com/2020/05/if-you-give-a-mouse-a-cookie-activities.html

https://www.earlychildhoodwebinars.com/webinars/building-on-ramps-and-in-roads-to-powerful-use-of-technology-with-young-children/

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Start your lesson plan!

1. Choose your lesson plan from previous modules. Decide how you will translate it into distance education: what combination of video calls and at-home activities makes sense?

2. Design the overall structure of the lesson plan in terms of video calls and at-home activities. Adapt the lesson plan you used into that new configuration.

The following items are for the at-home activities – a lesson plan to be implemented by parents/caregivers.

2.1. General purpose of the activity

what do you want children to learn with the activity? how does that connect to the national curriculum? how can you present that to families/caregivers?

2.2. Basic information about concepts being focused on in the activity

what concepts are central to the learning? how can they be defined/presented for parents to understand them? what main ideas need to be clarified? what resources can be listed to support further learning for adults on the concepts?

2.3. Required materials for the activity and suggested set-up

what materials will be needed? what alternatives are there for the preferred materials? where does it make sense to develop the activity? what other requirements are there for the set-up of the activity? any preparation needed?

2.4. Guidance for preparation and implementation

will this be an activity for families/caregivers to introduce or will there be a previous video call with you and other children? what is expected of the at-home activity?

what opening line and basic information should parents start with? what steps are needed to implement the activity? how and when will each material/resource be needed? how much time is suggested for each step? what feedback can/should be provided and on what to support learning?

how will you present this information in a guidance that motivates parents and makes them feel confident? how do you clarify what is central and what can be easily adapted?

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2.5. Tips for success

what are main ideas that need to be established during the activity? how can it be made fun for the children? what are expected difficulties that the children will face and how to support them?

2.6. Clear expectations about what, where, and how to be returned as result/product of the activity

what evidence is to be collected and how/when? will that be expected by email/platform, or will there be an opportunity for children to share what they did in a video call?

2.7. Follow-up activities

what other resources can be explored with the children? are there different ways to redo the activity that makes it interesting again?

3. Evaluate: how will you know if the activities accomplished their purpose? what evidence can you collect? what questions about your decisions and actions should be asked? how can you answer them?

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MODULE 4 – SESSION 2

Designing and Evaluating Learning Experiences for Children

LESSON PLAN

Learning gains

Review their lesson planning for distance learning for preschool children.

Examine the Role of the Teacher and Impact on Learning.

Explore ways to monitor and evaluate their teaching face to face and online.

Discuss reflective practice leading to quality provision and improved outcomes for children.

Understand and develop procedures that will help in the process of self-evaluation.

Time

3 hours – can be divided into 3 sections

Methods and techniques

Activity-based teaching method

Peer collaboration, station, cornering

Discussion techniques: (think, pair, share)

Individual work

Practical activities

Group discussions

Group work: design and evaluate activities

Resources, tools, and equipment

Presentation

Lesson plans

Worksheets

Videos

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LESSON PLAN

Previous topic/lesson

Module 4 – Session 1: Introduction to distance education with children with focus on Robotics: concepts and challenges

Prerequisites (knowledge, skills, etc.)

This module follows on from previous modules – therefore it is recommended that participants have completed the 3 previous modules in the training as they will be using their completed lesson plans developed in the previous modules.

Implementation of the Lesson

Introduction

Gaining attention

Welcome to the participants

Introductory question to encourage conversation:

- Are you Making a Difference?
- How do you know?

Opening Activity Slide 3 Ask participants to think individually about these 2 questions and their role in the preschool where they work or are on placement. Note down some thoughts and we will return to this later.

Concentrating on the area of learning of technology and robotics

Preschool Teachers/Inservice Teachers should have a shared understanding of

What they are aiming to do

Whether they are meeting their aims successfully

What needs to be maintained or improved?

Whether any changes made are working and improving outcomes for all children

(Approximate time 10 minutes)

Motivation + Reviewing previous lesson + Statement of the learning gains

In the previous lessons, participants had to design lesson plans including an educational robot – topic, subject and age group of their choice. These completed lesson plans will be used in this session. In the previous lesson they started to translate those proposals into distance education. Participants will:

Review their lesson planning for distance learning for preschool children

Explore ways to monitor and evaluate their teaching face to face and online

Discuss reflective practice leading to quality provision and improved outcomes for children

Understand and develop procedures that will help in the process of self-evaluation

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DEVELOPMENT

IMPLEMENTATION OF THE LESSON CORE

Section 1 – Adapting Lesson Plans for Online Learning (1.5 hour)

The lesson begins by reviewing the important points to remember when designing activities with smart toys, including educational robots covered in Module 2 (slide 5). And discusses the 7 general principles (slide 6)

(Approximate time 5 minutes)

Homework from Module 4 – Session 1 (slide 7) was to adapt their chosen completed lesson plans from previous modules to online learning

Small Group Activity Participants to share their adapted lesson plans for online learning in small groups (25 minutes) and feedback to the wider group (25 minutes). Discussion on specific challenges and benefits. *(Approximate time 50 minutes)*

Trainer to select an Energiser if needed from the list for 5 minutes. Slide 8

Small Group Activity Devise a list of tips and tricks for other teachers of important things to remember when adapting lessons for online learning. Then the participants add to the list of tips and tricks on slides 9 and 10. Emphasise that online learning and various engagement distance learning platforms serve as a great opportunity to engage families in meaningful ways.

(Approximate time 20 minutes)

Section 2 – Elements of good pedagogy (0.5 hour)

Now we will explore how elements of good pedagogy are similar for in-person and distance education. For example, the Role of the Teacher in distance education is (still) to facilitate continued learning and interaction opportunities while the children are not physically in the classroom.

Read slide 11 – Six components of good pedagogy in terms of impact on learning- We all agree that these principles need to be in place whether we are engaging in face to face or distance learning – let us take a closer look at how we can see that children are benefiting from the educational offer.

Slides 12 - 15

We are going to look closer at Ferre Laevers work as an example of an effective evaluation of how the environment/educational offer impacts children learning.

The Leuven Scale is a form of assessment developed by Ferre Laevers and his team at Leuven University in Belgium. It is a five-point scale that allows childcare practitioners to measure children's 'emotional well-being' and 'involvement' – two vital components of learning, development, and progress in children

Well Being: Ferre Laevers believes that when children have high levels of well being they will display the following; Children in a state of well-being feel like 'fish in water'. The prevailing mood in their lives is Pleasure: they have fun, enjoy each other's company and feel good in their environments.

Similarly, high levels of 'involvement' – characterised by curiosity, fascination, deep satisfaction and a genuine interest in what they are doing – is an indicator of 'deeper-level', meaningful learning. These signs of a child's 'involvement' are also directly linked to the characteristics of effective teaching and learning as laid out by the various Preschool Curriculum e.g., EYFS (Early Years Foundation Stage).

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But its major contribution lies in the discovery and conceptualization of well-being and involvement as key indicators of process quality. '**How are children doing?**' is the question that comes first. This is the most conclusive way to assess the quality of any educational or care setting. Even how limited it may be, any increase in the levels of well-being and involvement means children are getting emotionally stronger and are developing at a deeper level within the areas of development that are addressed while they are engaged. With these two measures teachers get the beacons to maximise their impact for the benefit of children today and the adults they become. An asset of this process-oriented approach is that it gives practitioners immediate feedback on the impact of their approach, it is relevant for any part of the curriculum and provides direct feedback.

Refer to the Handout The Leuven Scales while you discuss the next 2 slides 14 and 15 – signs of involvement and signs of wellbeing.

Slide 16 **Activity** – students observe the children in the video and allocate levels.

Trainer can select their own video for this activity.

Have printed copies of the worksheets available for students.

Using Worksheet templates "The Leuven Scale for Involvement and Wellbeing" – look at the photographs slides 16 - 19 and VIDEO and try to allocate a level to the child and provide the evidence why.

Students can use this template in their own preschools.

Feedback and group discussion.

(Approximate time 30 minutes)

Trainer to select an Energiser if needed from the list for 5 minutes. Slide 20

Section 3 – Are you Making a Difference Reflective Practice and Self Evaluation (1 hour)

Slides 21 and 22

Now we will look at finding the evidence to prove we are making a difference

Look back at the notes you made at the beginning of this session and we are concentrating on the area of technology and robotics

Preschool teachers should have a shared understanding of

What they are aiming to do

Whether they are meeting their aims successfully

What needs to be maintained or improved

Whether any changes made are working and improving outcomes for all children

How do they know all of the above?

ACTIVITY Individually Think about your favourite chocolate – why do you prefer it?

Write down a list of the criteria you use to make that decision.

Elements of quality should remain consistent no matter what our preference – self-evaluation helps us on this journey

Remembering that **our focus is Distance and Face to Face Learning Reinforced with Robotics**

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LESSON PLAN

Research and external inspection and validation continually demonstrate that staff who recognise their own strengths and areas for improvement are in a better position to take action and improve the learning outcomes for the children in their care.

Slides 23, 24, 25 – Read through the slides as an introduction to self-evaluation.

Slide 26 Before you begin – are you ready?

Practitioners to discuss – what do you need to do to allow this to happen?

When asked why we do something the answer is frequently:

Because that's the way we have always done it

Because the children love it

BUT… this is not acceptable. We need to be doing things because they are tried and tested, and we have reflected on and improved them.

If we think about it in our personal life… If our best friend says to us 'What do you think this hat is like on me?' and you hate it, how do you be honest without hurting their feelings? Or if it was you, would you want your friend to be honest or wouldn't you mind if you went out looking terrible in the hat but was told it was ok?!

To bring about the required changes EVERYONE needs to be involved and take responsibility for it so that it is not just left to one person. E.g. if the staff team sits down at the end of the day and feels that the session did not go well – the conversation needs to continue…..

You may already be reflecting in different ways e.g…….

Observations – environment, children, staff

Team meetings (discussions)

Staff support and supervision (121/ appraisal)

Development plans/ Action Plans

More formal assessment documents e.g., Highscope PQA, TTI document – trainer give examples of assessment toolkits from their country

What is Reflective Practice? (slide 27)

To explore issues in practice that have perplexed, puzzled, or surprised you

To draw out knowledge, skills, and values embedded or missing in your practice

To consider alternatives

To develop more effective practice

- Self-awareness: thinking of yourself, your experiences and your view of the world
- Self-improvement: learning from experiences and wanting to improve some area of your life
- Empowerment: putting you in control of making changes and behaving in a different way

Slide 28 – Clarify the difference between

Evaluation – informs practice

Applying critical thought or analysis to a situation

Reflection – transforms practice

Consciously stepping back, then into the action again, in order to move on

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Principles of reflection (slide 29)

ACTIVITY Participants to consider one event (positive or negative) that happened yesterday (can be personal life/ work etc) and ask themselves these questions on the slide

Give example: e.g., an argument with your partner over washing up!

It was very tense! I feel bitter!

I got the information off of my chest and said what I wanted to say!

s/He was annoyed with the confrontation!

I could've used I statements and taken away the blame

Approach the situation more calmly and use less blame

Agree on a compromise e.g. I cook, s/he washes up!

Why is it important to ask ourselves these questions?! (To improve/ make changes/ make things better…) This is reflective practice! How often do we reflect on what has happened within practice? Do you document this?

Slides 30 – 33 Trainer can go through these with students depending on interest or experience or jump to slide 34. Or this section can be referenced in the teachers handbook/curriculum document.

There are many different models of reflection. Using models, or at least being aware of their similarities and differences, can help you to deconstruct experiences, ensure you are accessing the deeper level reflective questions and issues, and ultimately provide a way to structure your learning from situations.

Several models of reflection are identified here as a quick overview. There is no right one.

The most important aspect of engaging in reflective practice for work-based learning is that your Reflective Practice is able to demonstrate a changed conceptual perspective.

The process of reflection potentially leads to more than just a gain in your knowledge it should also challenge the concepts and theories by which you make sense of that knowledge.

(Slide 34) To summarise – Always about Improving and enhancing the opportunities and experiences of and for children.

Show the **video** on Powerful Team Work (slide 35) http://www.youtube.com/watch?v=-i2wx4e321M

Clip of 'team work' approach –Traffic Jam – play clip and discuss how it took all members of the community, old and young, big and small etc to remove the tree trunk and clear the road. How did the people in the clip feel when they had achieved the outcome?

Ask group to consider what needs to be in place to begin the process of Self-Evaluation? Some ideas

All staff need to be involved

There needs to be an open honest attitude to standards of work and areas for improvement

There needs to be a clear understanding of the setting's aim and vision for the future

Time needs to be allocated to the process

There needs to be an understanding from all staff as to what self-evaluation involves

Good practice needs to be acknowledged and celebrated

An agreed focus needs to be decided upon

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Show the Cycle (slide 36) – The process should always begin with the Review and then follow the arrows around and name the points. Emphasise it is a continual process and should always be ongoing and embedded in practice.

How do you think you are doing at the moment? (slide 37) in face to face and distance learning in area of robotics

How do you know?

Think about the evidence you have to demonstrate what is going well in this area and what needs improvement

E.g., Comments from children & parents

Discussions with other settings

(slide 38) Consider how you capture the 'Voice of the child' in your setting

Children indicate their views in many ways – e.g., body language, facial expression, behaviours

Feedback on Flipchart

Article 12 of the Convention recognises that a child has the right to express an opinion and have that opinion taken into account in any matter affecting their lives

The article respects the views of all who are significant in the child's life and places an obligation on adults to ensure that children are enabled and encouraged to contribute their views on all relevant matters – if they want to

This does not mean that whatever children say must be compiled with – simply that their views are given proper consideration based on their level of knowledge of the issues

Childhood is the perfect time to develop foundational digital literacy skills, such as critical thinking, problem-solving, and online communication.

Implementing technology in the classroom is also an effective way to make tech literacy skills accessible. While some children may not have access to laptops or educational software at home, digitised education can increase technology literacy across all demographics by giving every child a chance to practise their skills.

Have equal amounts of outside play, drawing, painting, running, and building as you also incorporate tablet play, photo-documenting, and virtual options.

ACTIVITY AUDIT (slide 39 and Handout)

Anyone can tell themselves that they are doing a great job… but on what basis are they making that claim?'

Look at the sample audit on slide and explain the headings

Small Group ACTIVITY – Look at the Worksheet sample audit

Discuss the sample indicators and add your own. Feedback from each group

This can be completed with the staff teams in the preschools for homework

Conclusion

Summarizing

KEEP MOVING FORWARD! (slide 40)

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LESSON PLAN

Reflect: What is an idea you have that you would like to explore?

Dissect: What is necessary to make this plan/goal achievable?

What challenges might you experience along the way?

Who will help you to move the idea forward?

Determine:

What is your first step?

How will you know you were successful?

Homework

To complete the audit

Re-motivating (What will it do in real life?) + Closing the lesson implementation

The students are invited to complete the Reflection and Implementation Plan for Module 4 Slide 41

Ideas / new thinking I want to remember from this module

Unique learning point from today

Describe one example where my learning from today in theory and/or practice will help inform my future practice.

What will I do differently as a result of new learning?

End

Group are in a circle – throw the snowball (a crumpled piece of paper) to each other and say one word to describe how they are feeling at the end of the session.

Close – Goodbyes and thank you.

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WORKSHEET

Audit Distance and Face to Face Learning Reinforced with Robotics

Focus	Date of Audit
Distance and Face to Face Learning Reinforced with Robotics	
Purpose	
Evaluating distance learning and face to face activities that encourage children's engagement, curiosity, problem solving, independent exploration and appropriate risk taking.	

Possible Indicators	Audit Rating scale					Evidence and Further Action
	Never	Occasionally	Sometimes	Mostly	Always	
	1	2	3	4	5	
The staff are mindful and intentional when planning technology activities for preschool children.						
The staff choose technology activities for preschoolers that get children moving and interacting, rather than just sitting there staring at a screen.						
There are safeguards on all technology used.						
The preschool has a range of different digital tools for technology projects and interactive computer games.						

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WORKSHEET

We use a range of platforms to communicate with parents.						
As the staff interact with the children at play, they observe and evaluate the children's stages of development and their progress in learning.						
The staff use the information effectively to identify the needs of individual children and to meet those needs through the weekly planning.						
We consult with children so they can contribute their ideas.						

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EVALUATION

Reflection and Implementation Plan

Ideas / new thinking I want to remember from this module

What was my unique learning point from today?

Describe one example where my learning from today in theory and/or practice will help inform my future practice.

What will I do differently as a result of new learning?

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HANDOUT

The Leuven Scales

The Leuven Scale is a form of assessment developed by Ferre Laevers and his team at Leuven University in Belgium. It is a five-point scale that allows childcare practitioners to measure children's 'emotional well-being' and 'involvement' – two vital components of learning, development, and progress in children.

According to Laevers, children in a high state of '**well-being**' are like 'fish in water'. They are comfortable in their environment, confident and eager to experiment and explore. Whereas children with low levels of well-being often appear frightened, anxious, and dependent, making it hard for them to learn in a sustained way and explore their potential.

Similarly, high levels of '**involvement**' – characterised by curiosity, fascination, deep satisfaction, and a genuine interest in what they are doing – is an indicator of 'deeper-level', meaningful learning. These signs of a child's 'involvement' are also directly linked to the characteristics of effective teaching and learning as laid out by the EYFS (Early Years Foundation Stage).

The Leuven Scale for Emotional Well-being

Extremely low: The child shows clear signs of distress such as crying or screaming. They may seem withdrawn, frightened or aloof, and may behave aggressively, hurting themselves or others around them.

Low: They may seem uneasy and display a slumped posture. However, the discomfort is not evident all the time and is not as strongly expressed as in Level 1.

Moderate: The child has a neutral expression and demeanour. Their posture and expression neither show signs of sadness, pleasure, comfort or discomfort.

High: The child looks happy, cheerful, and satisfied. But these signals are not always present with the same intensity.

Extremely high: The child is lively, cheerful, confident and shows no signs of stress or tension. Their actions are spontaneous and expressive. They may talk to themselves, hum, sing and look entirely at ease with themselves.

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The Leuven Scale for Levels of Involvement

Extremely low: The child may seem absent-minded and displays a lack of energy. They may go around staring aimlessly or looking around to see what others are doing. Their actions may seem passive and repetitive.

Low: They are easily distracted. They might focus on a task while they are being observed, then lapse into phases of absent-mindedness – looking blankly at what is happening around them.

Moderate: The child may seem involved in an activity but at a routine level. They might look like they are making progress with what they are doing but rarely show much energy or concentration.

High: They are not easily distracted and seem entirely engrossed in what they do.

Extremely high: The child reveals continuous and intense activity indicating the complete involvement. They are focused, creative, lively, and persistent throughout nearly the entire period of observation.

Once you have made observations, it's critical to translate the assessments into a practical action plan. Here are the ten action points developed by the Centre for Experiential Education, headed by Ferre Laevers.

10 Action Points for Improving Children's Well-being and Involvement

1. Rearrange the activity areas in the classroom to more appealing corners or areas.
2. Assess the content/toys/books in the activity centres and make them more challenging.
3. Bring in new and non-traditional materials and activities that pique their curiosity.
4. Identify the children's interests and provide activities that engage their interest.
5. Encourage them and provide stimulating inputs.
6. Support them to develop positive relations amongst children and with the teachers.
7. Encourage them to display initiative.
8. Bring in activities that allow them to explore the world of feelings, emotions, and values.

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9. Identify children with emotional problems and chart out a plan for sustaining interventions.
10. Identify children with developmental needs and create interventions that encourage high levels of involvement.

The process-oriented strategy can be accessed by practitioners easily and can act as a highly useful screening tool to optimise the learning opportunities for each child. The technique is ideal to ensure you are providing the right 'physical' and 'emotional' environment for learning, at your setting.

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MODULE 5

Building Partnerships for Learning

MODULE 5 – SESSION 1

Building partnerships to enhance computational thinking skills The fundamental role of the educational community

LESSON PLAN

Learning gains

Understand the role of the educational community and the Partnership for Learning.

Understand teachers can how establish fruitful relationships with parents and families
Understand teachers can be supported (and sustain) the role of families in ECE learning,

Understand how external bodies can support ECE learning, and they can be involved in learning.

Time

2 hours

Methods and techniques

Face to face frontal learning

Activity-based teaching method

Peer collaboration

Discussion techniques: (think, pair, share)

Group and individual works

Resources, tools, and equipment

Texts, Videos, Worksheets

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LESSON PLAN

PREREQUISITES (KNOWLEDGE, SKILLS, ETC.)

For 3rd or 4th grade undergraduate students with prior knowledge about early education, knowledge from previous modules is requested.

NEXT TOPIC/LESSON

Module 5 – Session 2: Mapping and identifying national and local partners for the development of distance education on digital skills in ECE

IMPLEMENTATION OF THE LESSON

INTRODUCTION

GAINING ATTENTION

Distance Education: Do families and kindergarten have the availability and skills for it?

The teacher poses a question to the students: Distance Education for children requires that the people next to the child who is networked have 1) the necessary technology 2) the skills to assist the child in using educational platforms, interactive games, etc. What should be done if these availabilities do not exist?

MOTIVATION

This session is dedicated to discussing the need to build both local and national Learning Partnerships that can support the implementation of Distance Education (DE) in ECE

Students are taught to identify and engage potential partners, tailor activities and projects to meet partners' needs.

How many kindergartens do you know, if you know of any that would have systems and skills for good Distance Education?

In which non-school environments could Distance Education take place?

What equipment and digital communication systems are needed for a good Distance Education?

How many kindergarten teachers do you imagine have the skills to make a good one Distance Education?

To the students: These questions, and the answers, are important to place the need for the creation of Learning Partnerships in the right importance.

STATEMENT OF THE LEARNING GAINS

Students will be able to place the needs connected to the implementation of Distance Education in real situations, even if in simulation, especially in environments that will not necessarily be ready for this.

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DEVELOPMENT

IMPLEMENTATION OF THE LESSON CORE

The teacher presents some structures suitable for DE

The teacher presents some examples of Partnerships for Learning, as per the Worksheet.

The students, in groups of 3/4, assisted by the teacher, outline the needs in terms of equipment and skills required for Distance Education.

With the teacher, the students make a list of the digital needs and skills required for a good DE and try to place them in a known local situation.

ADDITIONAL ACTIVITY

Students are invited to draw up a questionnaire to be sent to parents, kindergarten teachers and other educational centres on the possibilities of carrying out DE in their own location.

The group teams evaluated in a peer-to-peer learning environment. They prepare a project and exchange it among the groups.

CONCLUSION

SUMMARIZING

This preliminary session is important for students, who do not always have experience of local situations related to early education, to reflect on the importance of creating a local educational community that supports families, schools and teachers in the implementation of DE.

HOMEWORK

The preparation of the Survey should be discussed with one of the actors of the educational community of choice.

The Survey is used in Module 5 – Session 2.

RE-MOTIVATING (WHAT WILL IT DO IN REAL LIFE?)

The preparation of the Survey will provide students with important real elements on which they can work in the next lessons by image of educational alliances.

ASSESSMENT/EVALUATION OR TESTING

Worksheet: Identify how the educational community can support families in the online education of children.

Assessment Form: Students will do the self-assessment.

END

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WORKSHEET

The need and role of the Partnership in Education

Explain why it is very fruitful, and even necessary, to involve Partnership in Distance Education in Early Childhood

1. The commitment to building an educating community requires that the actors, families and schools, public and private, are supported. Detailing these needs by also reflecting on a known local situation.
2. Elaborate the challenges involved in building a Partnership for Learning

The need of the Partnership for Learning	Challenges

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ASSESSMENT FORM

The need for a Partner of Learning, for real!

Assess yourself

1. How can I connect what I learned in this Session about the issues of actualising the DE with what I have learned about Distance Education in previous Lessons?
2. What idea have I got, how do I imagine DE sessions in my kindergarten, school, home?
3. Do I understand the need for a Partnership for Learning for a good DE?

Connect	Extend	Challenge

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HANDOUT

Building local and national partnership for learning

Involving our educational communities

Several social structures are involved in early childhood education outside of schools: parents, families, carers, early childhood playground, schools in hospitals, religious centres, etc. All these educational figures can support children's learning in different ways, according to their skills and expertise, and also to the kind of relationships they have with families and children. Involving parents and other members of a family in developing computational thinking skills to children in early childhood can be a valuable and effective approach. Families play a critical role in their child's learning and development and involving them in the learning process can have numerous benefits for the child. Here are some ways in which parents can be involved.

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The Learning Partners can support families

Introducing coding and educational robotics, plugged and unplugged, into kindergartens is a complex task, especially since these educational facilities still suffer from a traditional educational methodology and are often structured informally. For this reason, an alliance of partners with educational experience and digital skills and competences to support the project is crucial. It may be that public and private school facilities, kindergartens and play centres do not have the digital communication equipment and skills required either. Here, too, it will be necessary to find partners who support online communication.

These can be both public and private schools and educational centres such as playgrounds, museums, libraries, parents' associations, sports centres, etc. Students should be able to apply digital skills activities for early years in the communities they surveyed and apply their experience to modulate games, events and other educational activities to the chosen context.

For example, if the partner were a sports association, students could design algorithmic games inspired by sport and play.

Another example is children's playgrounds. In this case, it would be possible to design interactive games using the park's own digital technology material. In this way, children would continue to develop their digital skills remotely.

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Alliances for Education

National coalitions are multi-stakeholder partnerships that bring together a range of partners with the aim of developing concrete measures to deliver digital skills to every level of society in their countries.

Involving educational centres outside schools (such as NGOs, business, museums, libraries, community centres and other organisations), in teaching computational thinking skills to children in early childhood can be a valuable approach. These entities bring different perspectives, resources, and expertise to the educational activities, which can enhance children's learning experience.

MODULE 5 – SESSION 2

Mapping and identifying national and local partners for the development of distance education on digital skills in ECE

LESSON PLAN

Learning gains

Students will work on the identification and selection of potential learning partners and prepare a work plan to achieve an agreement on the topic among all.

Mapping a selected city, village, area.

Identify potential Partners.

Organize a first meeting and outline the project.

Discuss the governance of the Partnership with them.

Define roles and tasks.

Carry out a monitoring of the target group, such as, numbers and location.

Evaluate the resources of the selected area and compare them with the task of a good DE.

Prepare a plan according to the data collected.

Time

2 hours

Methods and techniques

Face to face frontal learning

Activity-based teaching method

Discussion techniques: (think, pair, share)

Peer collaboration

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Discussion techniques: (think, pair, share)

Group and individual works

Resources, tools, and equipment

Texts, Videos, Worksheets, Handout, Search on the Internet

References enclosed

Previous topic/lesson

Module 5 – Session 1: Building partnerships to enhance computational thinking skills;

The fundamental role of the educational community

Prerequisites (knowledge, skills, etc.)

Students should know handle some simple survey methods and develop background concepts of sociology of governance.

Next topic/lesson

Module 5 – Session 3: Inspirational: The COVID-19 emergency has prompted us to use ICT technology in school ...and to connect with others

IMPLEMENTATION OF THE LESSON

Introduction

Gaining attention

The teacher asks students to select a real learning situation/area, and which of the local/national Partners/stakeholders could be activated to build an educational partnership.

Motivation

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS – Digital Education Action Plan 2021-2027 Resetting education and training for the digital age. Brussels, 30.9.2020

Effective digital capacity planning and development is vital for education and training systems.

This requires the development and ongoing review and updating of digital strategies addressing technology gaps in infrastructure, devices and developing relevant organisational capabilities in education, including the capacity to deliver hybrid modes of learning and teaching (remote and on-site). Capacity should be developed to ensure accessibility to assistive technologies and accessible digital content and more generally address unequal access, e.g., on socio-economic or rural-urban grounds. Institutionalised support is essential for such planning and development, as are interdisciplinary teams including management, technologists and instructional designers, with the needs and experience of education and training staff at the centre.

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This European statement/recommendation, expressed during the CVID, fits well with our project as it highlights the need for institutional support, or in any case outside the school.

Reviewing previous lesson

Teacher asks learners to recall the most important topics of previous topics about the need to create Partnerships for Learning

Statement of the learning gains

Creating Partnerships for Learning in the real world involves several complex problems, all the more so if the communities of choice are complex in their structure. We will have to adapt our theoretical knowledge to real situations, but we can get help from simulations with real data and use tools from sociology applied to digital and human-digital Interaction.

Development

Implementation of the lesson core

Introduction

2023 has been designated by the European Commission as the Year of Skills and several initiatives have been launched to build National Alliances for digital education and skills. The initiatives will not be limited to 2023, but from this year they will extend to 2027. National coalitions are multi-stakeholder partnerships that bring together a range of partners with the aim of developing concrete measures to deliver digital skills to every level of society in their countries. Involvement of other educational centres. Involving educational centres outside in teaching computational thinking skills to children in early childhood can be a valuable approach. These entities bring different perspectives, resources, and expertise to the educational activities, which can enhance children's learning experience. Involving educational centres outside schools in teaching computational thinking skills to children in early childhood can be a valuable approach. These entities bring different perspectives, resources, and expertise to the educational activities, which can enhance children's learning experience.

The educational community of children from 0 to 6 and 7 years is the complex social structure that includes parents and families, public and private kindergarten, religious centres, schools in hospitals, play centres, sports and religious centres, up to the media by which children can be influenced, and educated. All these figures can – and should – work together to develop all the children's abilities and potential.

Children can live with the family, or go to kindergarten and then return home, or, if the parents work or the children like it, they can continue their day in play centres, other private facilities or with relatives.

In relation to the possibilities of remote digital education for children, it is certain that the educational community, at local and national level, can support the families, especially when they do not have digital devices or the skills to use digital educational platforms and tools.

The teacher asks students to present in groups their Survey (see Module 5 – Session 1).

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The teacher begins by presenting the students some examples of Partnerships for Learning as also described in Handout 1. In various European countries, ECE education has envisaged alliances with actors, from families to educational centres present in the area. The teacher lists some actors who could be potential Partners, beyond the families and the public and private school, and who could be, for various reasons, interested in DE in ECE.

Schools in Hospital

Parents 'associations

Centre Inclusive Education

Sports centres and associations

Playgrounds

Museums

Libraries

Music schools

(...)

The teacher asks the students to add other potential partners and to elaborate which of these would be more interested in DE in digital competences and why.

How to activate the cooperation with the Partners

Teacher presents some ways in which partners can be involved in the Alliance for Learning:

- Guest speakers: Inviting experts to give talks or conduct workshops can be an effective way to expose children to different perspectives and ideas. They can provide children with real-world examples of how computational thinking can be applied to solve social and environmental problems.
- Collaborative projects: Collaborating with external entities on projects can be an excellent way to integrate computational thinking skills into real-world contexts. For example, children can work with them to develop an application to raise awareness about a social issue (such as sustainability awareness).
- Mentoring programs: Establishing mentoring programs between external organisations and children can be an effective way to provide individualised support and guidance to children. Mentors can help children develop their computational thinking skills and provide them with feedback and guidance on their projects.
- Resource sharing: external bodies can provide resources such as software, hardware, and learning materials to enhance children's learning experience. Moreover, they can provide professional development opportunities for teachers to improve their knowledge and skills in teaching computational thinking.
- Finding resources: equipment or financial contribution.
- Dissemination of the project results.

Teacher asks students to add more common activities for the Partners.

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Use local, national and European events to foster the Partnership

There are national and European events dedicated to coding and educational robotics where even 4-5 year old can participate. Among these, we mention the Junior section of the First Lego League and the EU Code Week. EU Code Week aims to mainstream coding, computational thinking, and digital literacy in educational settings and boost new ideas by bringing motivated people together. By participating in these events, children can submit their creations, drawings, flowcharts, videos, and participate in online Finals with great enthusiasm.

Non-competitive challenges can be used in early childhood education to foster computational thinking and encourage engagement with parents, caregivers, and other external entities. These types of events must be designed to be fun and engaging while also teaching children fundamental computational thinking concepts.

Here are some ways in which parties and non-competitive challenges can be used:

- Coding parties: Hosting coding parties is a great way to make coding fun and engaging for children. Coding parties can involve various coding activities, including coding games, building simple robots, physically based games to learn algorithmic thinking. By involving parents and caregivers, these parties can also help to foster collaborative learning and promote parent-child interactions.
- Design challenges: Design challenges, such as creating a bridge or building a tower, can be an excellent way to teach children about the design process and computational thinking concepts such as problem-solving and algorithm development. These challenges can be done in groups, with children working with their parents and caregivers or other external entities, to promote teamwork and collaboration.
- Hackathons: Hackathons are events where participants collaborate on solving problems using technology. These events can be tailored to children, and they can be an excellent way to encourage children to use computational thinking to solve real-world problems. Parents and caregivers can also participate in these events, providing support and guidance to the children.
- Puzzle challenges: Puzzle challenges can involve different types of puzzles. These challenges can help children develop logical thinking and problem-solving skills, which are important components of computational thinking.
- Robot challenges: Robot challenges involve building and programming robots to complete a specific task. These challenges can be done in groups, and children can work with their parents and caregivers to design and program the robots. These challenges can promote creativity, problem-solving, and teamwork while also teaching children about the basics of programming and robotics.

EU Code Week: https://codeweek.eu

Eu Robotics Week: https://eu-robotics.net/eurobotics/activities/european-robotics-week

First Lego league Junior: https://www.firstlegoleague.org

Meet and Code: https://meet-and-code.org

The EU Code Week Online Bootcamp is a new EU Code Week MOOC that will provide pre-primary, primary and secondary school teachers with practical ideas, tools and resources to help them bring coding and computational thinking into the classroom. Teachers will

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raise awareness of diversity and inclusion in coding and explore the potentials of artificial intelligence in education.

In this three-module course, they will experiment with new learning materials and challenges, and they will create their own activities. Teachers will be introduced to the EU Code Week initiative and the opportunities it offers. They will connect with like-minded peers and become part of a community that fosters collaboration, teamwork and exchange of good practice and stimulates discussion and reflection. This MOOC will be organised around the concept of blended learning with onsite study-groups working alongside the online course.

https://twitter.com/hashtag/OnlineBootcampMOOC

https://www.europeanschoolnetacademy.eu/courses/course-v1:CodeWeek+OnlineBootcamp+2021/about

Conclusion

Online resources

Cf. the link above

Homework

Worksheet: Develop a plan to identify and map the potential partners of the selected local/national educational community.

Handout 1 and 2: How to build partnerships for Learning to enhance learning in ECE.

Re-motivating (what will it do in real life?)

We created together some plans to build a real Partnership for ECE Education. Let's apply to the selected community now.

Evaluation or testing

Students will do the self-assessment on Module 1 – Assessment Form

End

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WORKSHEET

Mapping and profiling the Identified Partners of the Educational Community

- Select and identify the educational community to work with and where potential partners have been identified.
- Profile appropriate partners for the project.
- Imagine the type of agreement and convention to propose.
- Challenges: Identifying challenges in view of collaboration between the different partners. Differences and commonalities.

Identifying the Partner for Learning	Challenges

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HANDOUT 1

Involving partners in educational projects and community events

Rewarding project participants

A common educational project needs moments of social representation. This allows the children to show what they have learnt and achieved and socially rewards the commitment of all the actors in the community. The event also rewards parental engagement, and encourages early learning.

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Intermediate project events can be organised, in schools or educational centres, inviting families. A final event could be more important, organised in a theater or classroom, inviting also political representatives of the community.

Coding events for children: EU Code Week, European Robotics Week, and the FLL Junior

To strengthen partnerships for Education, joint events are very useful. All the more so if these events link up with European or global actions and initiatives.

EU Code Week is a week – but can last even longer – dedicated to coding events taking place simultaneously all over Europe. There are many events taking place in kindergartens. They can be viewed here: https://codeweek.eu/view

HANDOUT 1

The European Robotics Week (ERW) is similar to the EU Code Week. Both weeks are promoted by the European Commission and are attended by thousands of schools and educational centres. Kindergarten children participated in the ERW with small competitions or robotics events. https://eu-robotics.net/eurobotics/activities/european-robotics-week

The First Lego League is a coding and educational robotics competition that takes place in many countries around the world. Children from 4 to 6 years old can also participate.

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HANDOUT 2

Inspirational cases of Partnership for Education in ECE

There are several interesting experiences of educational partnerships in Europe that have developed stable alliances with local, national and even international communities.

The European Agency for Special Needs and Inclusive Education

The European Agency for Special Needs and Inclusive Education undertook a three-year project (2015–2017) entitled Inclusive Early Childhood Education. It aimed to identify, analyse and subsequently promote the main characteristics of quality inclusive early childhood education (IECE) for all children from three years of age to the start of primary education. This provided an opportunity to examine more closely how, within an inclusive perspective, IECE provisions across Europe are addressing the quality principles already identified by the European Commission (2014) and the OECD (2015).

The Agency Report here:

https://www.european-agency.org/sites/default/files/IECE-Summary-ENelectronic.pdf

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HANDOUT 2

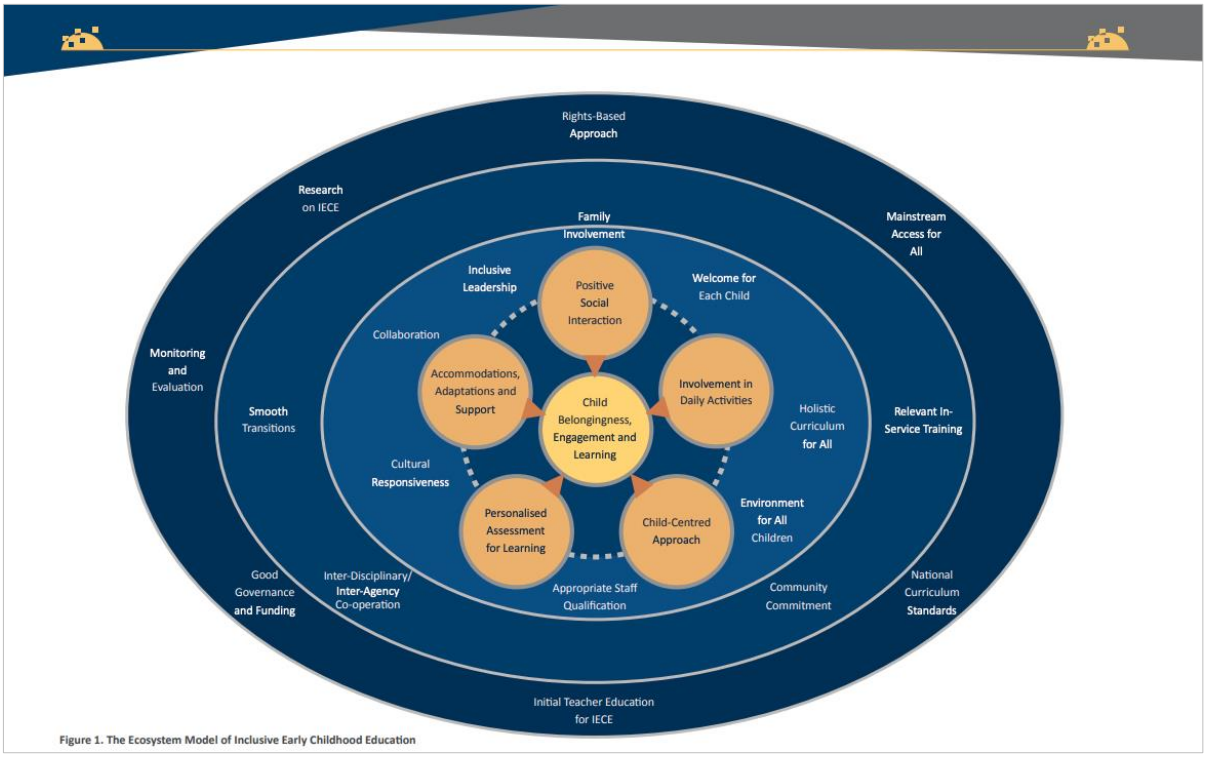

Figure 1. The Ecosystem Model of Inclusive Early Childhood Education

Reggio Children, Modena (Italy)

In 2023, Reggio Children Foundation started the first Community Building experiment of the Reggiane Innovation Park. A project that coincides with the Reggiane Parco Innovazione's mission to offer a system of settlement opportunities and services to the territory to create value for companies (both existing and new) and for people (by enhancing their talents and skills) in order to generate contamination and open innovation projects to support the city's development and economic growth. The activities, organised by the Reggio Children Foundation together with Pause-Atelier dei Sapori, ReMida and Scintillae, are part of the Community Building project begun last year. The project involved more than 90 participants of the local community.

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HANDOUT 2

Reggio Children

eTwinning: Improving Children's and Staff's Digital Competence

Launched in 2022, the European School Education Platform is the meeting point for all school staff (from early childhood education and care to primary and secondary education, including initial vocational education and training), researchers, policymakers and other stakeholders in the school education field. The European School Education Platform is a single platform that integrates the former platforms and services of eTwinning, School Education Gateway and Teacher Academy. As of 2022, the eTwinning community has been hosted in a restricted area within the European School Education Platform. This area is only accessible to school staff validated by the National Support Organisations. Since its launch in 2005, eTwinning has grown from a grassroots initiative into an active school community, and has involved more than 1 053 000 school staff working in more than 233 000 schools, across more than 40 countries. eTwinning provides a safe digital platform where teachers are engaged in various activities from designing and implementing European collaborative projects to networking, and from participating in virtual groups to professional development and peer learning. Through its platform, which is available in more than 30

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languages, eTwinning provides a range of resources and learning opportunities for teachers. The topics of these resources include the benefits of engaging with eTwinning, 21st-century skills, the use of ICT in education and project kits for inspiration and guidance. Registered teachers have access to the restricted area of the platform, called eTwinning Area. The European School Education Platform and the eTwinning community are funded by Erasmus+, the European programme for education, training, youth and sport. They are initiatives of the European Commission's Directorate-General for Education, Youth, Sport and Culture. The platform is operated by European Schoolnet (providing coordination, content and services) and Tremend Software Consulting SRL (providing technical infrastructure), both under service contracts with the European Education and Culture Executive Agency (EACEA). The eTwinning community also exists thanks to the support of the National Support Organisations, funded by Erasmus+ under grant agreements with the European Education and Culture Executive Agency, and the Supportive Partners.

By: *the European Commission, European Education and Culture Executive Agency, Exploring the impact of eTwinning in early childhood education and care and initial vocational education and training – Summary report 2022, Publications Office of the European Union, 2022,* https://data.europa.eu/doi/10.2797/892365

PRECEDE Partnership for Reconciliation through Early Childhood Education and Development in Europe

To support civil society influence over reconciliation process and cohesion through education in early years in the Balkan region and Europe. PRECEDE (2012) developed a sustainable Balkan Region Network of civil society organisations concerned with young children and promoting acceptance of others and respect for diversity; sustainable country level networks of civil society organisations promoting acceptance of others and respect for diversity through early childhood education (ECD) in the Western Balkan region countries; and linked country level networks and the PRECEDE Network of civil society organisations with the International Network for Young Children in Conflict and Post-conflict Countries.

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HANDOUT 2

See: https://tacso.eu/database/regional-networks/social-inclusion/project-precede-partnership-for-reconciliation-through-early-childhood-education-and-development-in-europe

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MODULE 5 – SESSION 3

Inspirational: The COVID-19 emergency has prompted us to use ICT technology in school ...and to connect with others

LESSON PLAN

Learning gains

Review examples of successful Partnership for Learning experiences in Europe.

Time

1 hour

Methods and techniques

Activity-based teaching method

Discussion techniques: (think, pair, share)

Group and individual work: Worksheets

Resources, tools, and equipment

Texts, Handouts, Worksheets

Previous topic/lesson

Module 5 – Session 2: Mapping and identifying national and local partners for the development of distance education on digital skills in ECE

Prerequisites (knowledge, skills, etc.)

Students should have proficiency in English for reading the texts and the suggested links.

Next topic/lessons

Module 5 – Session 4: Five steps to developing a Community Engaged Learning programme, module or project

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LESSON PLAN

IMPLEMENTATION OF THE LESSON

INTRODUCTION

GAINING ATTENTION

Here we learn from other successful experiences of Partnership for Learning how to work with Partners to enhance our experience, enrich teachers practice and have a positive social impact as part of your curriculum design.

MOTIVATION

"We have developed networks with local preschools, other education and care services and schools in our area. Networks and professional learning communities enable us to utilise the strengths and knowledge of other professionals. We meet once a term to discuss, reflect and share information about program documentation, policy development and emerging early childhood topics of interest. Working together, we build on our knowledge and implementation of early childhood pedagogy. Our partnerships extend to the broader community. We have broken down distance barriers by using technology to network with colleagues who are in rural and remote areas". Kathryn Wetenhall and Rebecca Andrews from John Brotchie Nursery School, News South West State, Australia.

REVIEWING PREVIOUS LESSON

Teacher asks students to present their plan for a Partnership for Learning (the Homework of previous Session 2).

STATEMENT OF THE LEARNING GAINS

The lecturer outlines that the lesson will be dedicated to analysing examples of successful Partnership for Learning experiences in Europe.

DEVELOPMENT

IMPLEMENTATION OF THE LESSON CORE

Many Distance Learning experiences have been carried out during and due to the COVID-19 lock down all over the world. The closure obligation made it necessary to use educational platforms that we all quickly learned to use. While previously Distance Learning was rarely used and always in conjunction with the physical presence of a teacher, in the two years of the COVID-19 emergency methodologies have been developed that would not have been imagined before. Since the emergence of COVID-19 remote or blended education has become important and the many experiences of these difficult years have taught teachers, schools and stakeholders how to cooperate to improve digital early education. Of course, DE has been used very little in ECE, due to the challenges this project is trying to address.

Here quoted some actions by the European Commission and the European Parliament in the field of blended education. Students are invited to read those texts and comment in groups.

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1. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Digital Education Action Plan 2021-2027 Resetting education and training for the digital age. Brussels, 30.9.2020

To address the COVID-19 emergency in early education, the EC published a document citing blended education as a methodology to reach every child and to support families. Here are some quotes.

Nota Bene: the issue of equality solutions offered by DE, if properly employed, for isolated rural areas or for areas difficult to reach in presence.

Effective digital capacity planning and development is vital for education and training systems.

This requires the development and ongoing review and updating of digital strategies addressing technology gaps in infrastructure, devices and developing relevant organisational capabilities in education, including the capacity to deliver hybrid modes of learning and teaching (*remote and on-site*). Capacity should be developed to ensure accessibility to assistive technologies and accessible digital content and more generally address unequal access, e.g. on socio-economic or rural-urban grounds. Institutionalised support is essential for such planning and development, as are interdisciplinary teams including management, technologists and instructional designers, with the needs and experience of education and training staff at the centre.

(...) The COVID-19 pandemic is impacting heavily on education and training systems. In highly difficult circumstances it has accelerated the digital transformation and triggered rapid, largescale change. Developments that could have taken years happened in just a few weeks. We are now faced with both challenges and opportunities. This means we need to use the lessons of recent months to step up our efforts and gradually evolve from temporary, emergency *focused remote education* to more effective, sustainable and equitable digital education, as part of creative, flexible, modern and inclusive education and training. This process should be informed by contemporary teaching practices and research.

Member States should build on the momentum of recent months to develop higher quality, more accessible and more inclusive digital teaching, learning and assessment. In particular, Member States should make full use of the European Union's Recovery and Resilience Facility for adapting their education and training systems to the digital age. This will help to ensure that all Europeans, whether they live in urban or rural areas, in the periphery or in capital regions, and regardless of their age, have the digital skills they need to live, work, learn and thrive in the 21st century. Transforming education and training systems is a key part of the vision for a Europe fit for the digital age. However, such transformation will not happen from one day to the next. It requires strategic and concerted action, as well as the pooling of resources, investment and political will to move ahead at EU and national level. Making the digital leap in education and training will be vital for people to achieve their potential without leaving anyone behind. It will also be vital for proving the effectiveness, relevance and legitimacy of education and training systems in preparing for – and shaping – the future.

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2. SCHOLA EUROPAEA (THE EUROPEAN SCHOOL)

The European Schools and the Accredited European Schools are educational institutions set up in the European Union's Member States. They provide children with a multilingual and multicultural education at nursery, primary and secondary levels. So

Some quotes from the Manual "Early Education Curriculum – Nursery and Primary Cycles of the European Schools".

Distance learning and blended learning

In general, teaching shall be provided on site. In exceptional cases, distance teaching and learning should be organised to ensure pedagogical continuity in education for nursery children. In a distance learning situation, school strives to connect all stakeholders (teachers, children, parents) with each other. The family situation needs to be considered. The well-being of the child is essential, and it is an important prerequisite for successful learning. There should be a balance between online and off-line learning situations offered to children.

One of the main differences between the different learning environments is the children´s ability to sustain engagement in an online learning and distant learning setting. In a distance learning and an online learning scenario, all children will benefit from online contact with their teachers and peers for a collective sense of purpose and belonging.

https://www.eursc.eu/Syllabuses/2022-01-D-42-en-2.pdf

CONCLUSION

SUMMARIZING

It is important for the students to acknowledge that the European Union State are interested in ED and that many steps forward have been made due to and during the period of the COVID-19 emergency. These experiences should be continued and encouraged

RE-MOTIVATING (WHAT WILL IT DO IN REAL LIFE?)

Previous experiences, also carried out in emergency situations, have highlighted various points:

1. the DE offers many educational benefits, esp. for digital skills improvement.
2. DE is a complex activity at ECE level.
3. Teachers, carers, families, etc. etc need a proper formation in DE, especially in ECE.

ASSESSMENT / EVALUATION OR TESTING

Students will do the self-assessment on Module 1 – Assessment Form

END

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WORKSHEET

Simulating a project in the selected local/national community

- You have identified the educational community in which you select potential partners. Now imagine what steps you will take to start a distance learning for early education project.
- Meet the Partners and present the project. What will be the challenges?

Simulating a project in the selected local/national community	Challenges

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MODULE 5 – SESSION 4

Five steps to developing a Community Engaged Learning programme, module or project

LESSON PLAN

Learning gains

How to organize a working plan to activate and inspire the Partnership.

Time

1 hour

Methods and techniques

Activity-based teaching method

Peer collaboration, station, cornering

Discussion techniques: (think, pair, share)

Workshops (In groups of 3, 4, or 5)

Group and individual works: Worksheets, Plans, Gantt

Resources, tools, and equipment

Excel software, Mental maps, Post-it Digitals, Padlets.

Previous topic/lesson

Module 5 – Session 3: Inspirational: The COVID-19 emergency has prompted us to use ICT technology in school ...and to connect with others

Prerequisites (knowledge, skills, etc.)

Basic use of online discussion tools.

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LESSON PLAN

IMPLEMENTATION OF THE LESSON

Introduction

Gaining attention

Would you like to have an advice toolkit to create and manage a Partnership for Learning? Here is one.

Motivation

You have a very rich learning experience where students collaborate with external partners to address real-world challenges and opportunities as part of their assignments and research. We experience the profound feeling of being part of sustainable communities.

Reviewing previous lesson

Review the Session 1, the Survey and the Map of the potential Partners.

Statement of the learning gains

Enhancing students' experience, engagement and leadership.

Increasing students 'sensitivity and capacity to manage diversity.

Preparing students for the workplace and the world.

Students become Community Engaged Learning Ambassadors.

DEVELOPMENT

Implementation of the lesson core

1. Starting a Partnership for Learning

Once you have identified the local/national area where to build the Partnership, general objectives of the potential Partnership and the learning outcomes of the programme, consider who would be a suitable partner for your plan. Keep in mind that the program must be submitted to the Partners and approved.

Ask yourself these questions:

Are there, in your selected community, social issues or populations with whom you would like to tackle and engage?

What community needs might be impacted by the activities of the Partnership?

How will the What organisations match well with the programme or module learning outcomes?

Steps:

- Use a Map (Google Map, other) to locate kindergartens, schools, educational centre, institutions, etc.

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- Call your local Public Education headquarter.
- Call your Municipality, Educational Office.
- Call the local NGO Associations, Parent Associations, Church educational centres, (...)

Explore existing networks: There are probably support networks for schools, kindergartens, families.

Check if there are voluntary associations, if there are internship projects for students.

2. Selecting and getting to know the Partners

Gather information about their mission, values, programming, and activities

3. Activating the Partners

- Discuss roles and agree each partner has equal value.
- Develop ground rules for the partnership.
- Develop a Memorandum of Understanding.
- Timing and duration of Partnerships.
- Establish a contact person for each partner and a tool to support ongoing communication.
- Determine a location for partnership meetings and conversations.

4. The Program

- Identify adjustments to the programme.
- Define the module that need to be made.
- Determine deadlines.

5. Determine the measure of success and assessing risks:

- How successful have you found this experience to be?
- How can we adjust program and procedures to continue to work together improving our project?

6. Identify costs and logistics.

7. Dissemination and public conferences.

Conclusion

Summarizing

We have outlined some steps for students to discuss in view of setting up a Partnership for Learning. Depending on the environment, the Partnership and the set Program the steps may change. A Partnership for Learning dedicated to DE in ECE will necessarily include several in-person activities, including digital logistics for preparing programmes and platforms, training of teachers and staff, and fairly assiduous monitoring. For this, it is necessary that Partners include skilled actors who have the disposition to assist less experienced participants.

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Homework

Students are invited to consult the Handout about the Eurostat survey on DE in Europe, 2022

Re-motivating (what will it do in real life?)

The students should get involved and think of a real project, even a small-scale project to be realised in the short future.

Assessment / evaluation or testing

Students will do the self-assessment on Module 1 – Assessment Form

End

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WORKSHEET

Connecting with Europe – The European Partnership for Education

- Select and identify the actions and events taking place in Europe in the field of Building Partnership for Education.
- Imagine your local/national Partnership participating in one of these actions (Eu Code Week; Erasmus plus Calls, etc)
- Challenges: Identifying challenges

The European Partnership for Education	Challenges

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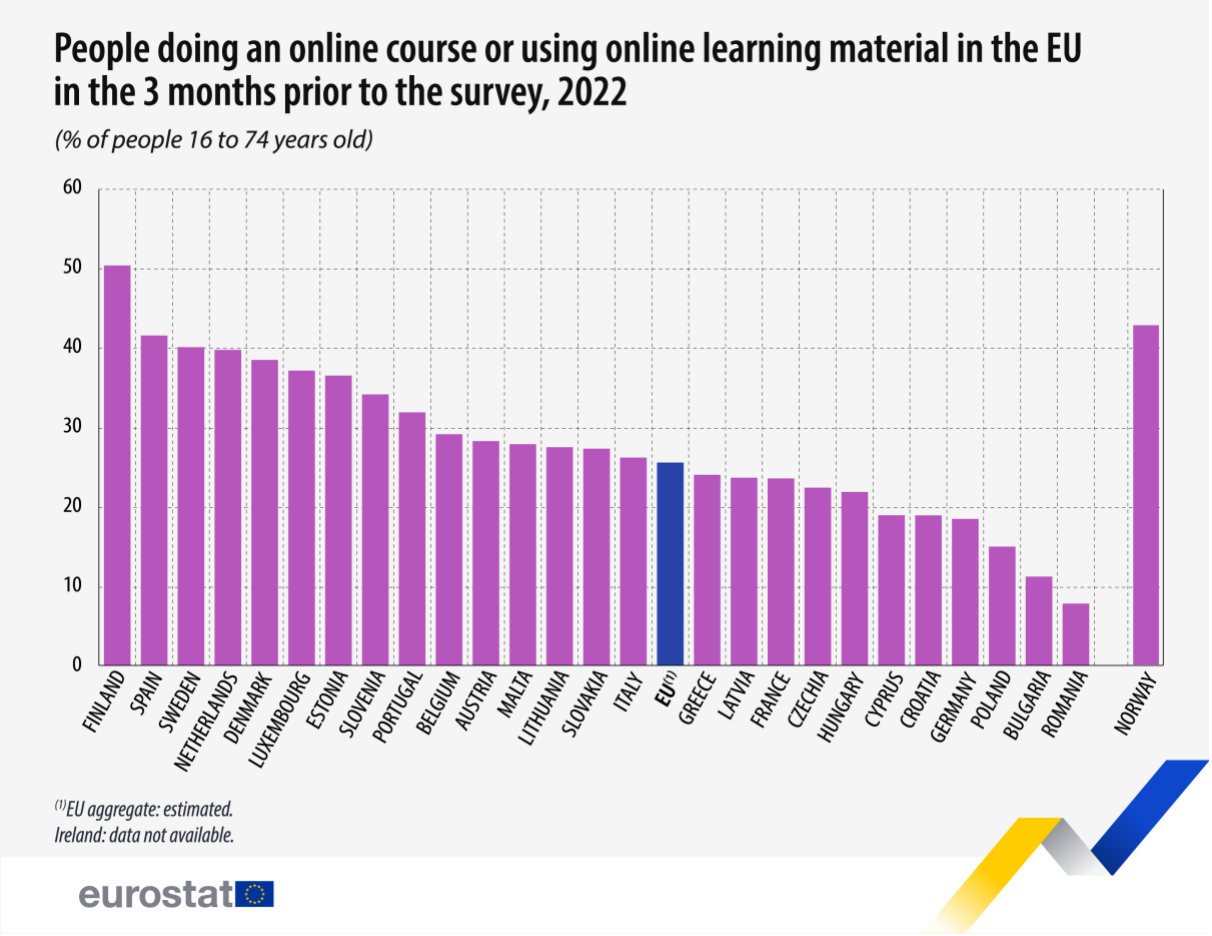
HANDOUT

ONLINE COURSE
Some data and world projects for ECE Education

Online Education 2022 – Data from EUROSTAT

During the COVID-19 pandemic, when people were encouraged to limit social contact, online courses were a safe alternative for education and training and grew in popularity. However, as social restrictions eased, the popularity of online courses decreased.

In 2022, 26% of people aged 16 to 74 in the EU reported that they had done an online course or used online learning material in the three months prior to the survey; this is a 2-percentage point (pp) decrease compared with 28% in 2021.



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In 2022, among all EU Members, Finland had the highest share (50%) of people aged 16 to 74 doing an online course or using online learning material, followed by Spain (42%), Sweden and the Netherlands (both 40%).

At the other end of the scale, doing online courses or using online learning material was not very common in Romania (8%), Bulgaria (11%) and Poland (15%).

In general, participation in online education decreased compared with 2021. In 2022, the share of people doing online courses or using online learning material decreased in all the EU countries except for Finland (+5 pp in 2022 compared with 2021), Croatia (+1 pp) and Czechia and Italy (both unchanged). The highest decreases were registered in Slovenia (-7 pp), Luxembourg (-6 pp) and Belgium, Estonia, Austria and Sweden (all -5 pp).

Source: Eurostat https://ec.europa.eu/eurostat/web/products-eurostat-news/w/edn-20230124-1

ECE Distance Education in the USA

Remote learning might have resulted in very different perceptions of children's experiences for teachers and families. In contrast to traditional in-person education, remote education has allowed families to observe and be involved in children's learning directly, while teachers rely on virtual observations (Buechner Institute for Governance, 2012). This way, remote learning might have impacted the educators' ability to understand children's learning and social processes fully. At the same time, families had immediate exposure to children's learning process. This shift has surely affected parents and teachers differently, and to date, no studies have addressed these differences.

Virtual learning has been expanding in the United States and in the world even before the COVID-19 crisis; in the past decade, the number of students attending school online has grown significantly. For example, in 2013, 31 states in the U.S. had schools that operated fully online (Currie-Rubin & Smith, 2014). Early childhood online instruction has also become more common. Programs such as the Upstart program have been providing online preschool instruction for thousands of children in the United States since 2013 (Mader, 2020). The program is funded by the United States federal government and provides online preschool education for young children in several U.S. states. As some degree of online instruction is expected to become more common in the future, the lessons learned during this pandemic might prove informative and even invaluable during this crisis and in the

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future years. The lessons learned during the COVID-19 crisis might help inform future practices related to distance learning in early childhood.

In the US, several Distance Education (DE) for early children's courses and experiences are underway.

In Washington, DC, the Office for DE in kindergartens has initiated a series of DE experiences. In the United States, The Office of the State Superintendent of Education (OSSE) started to promote the use of distance learning technology in early childhood education (ECE) as a medium to deliver training and technical assistance and this has significantly increased in recent years.

Distance learning commonly refers to learning opportunities for children that are available online. Currently, there are a host of distance learning systems within the ECE community.

The level of engagement and conversation needed often drives the platform used. Large-scale trainings are often supported using GotoWebinar, Cisco Webex and Adobe Connect. Smaller, more imitate courses with no more than 100 participants are often offered using Zoom, Microsoft Teams and GoToMeeting.

Google Hangouts, Google Classroom and Blackboard are often used to teach ongoing courses, especially in K-12 settings, where extensive collaboration between students and teachers are warranted.

OSSE recommends that early childhood providers in the District use Google Hangouts to support web-based interactions with families. Google Hangouts is a free resource from Google, completely integrated with Google mail and calendar systems with an app available. A Google Hangouts training series has been developed to aid teachers and directors in utilizing the

free resource. The training will provide an overview of Google Hangouts, assistance in navigating the system and share strategies for using it as a tool to support family engagement.

https://osse.dc.gov/sites/default/files/dc/sites/osse/service_content/attachments/Distance%20Learning%20for%20ECE.pdf

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HANDOUT

GETTING STARTED

- Develop an outline for what you would like to accomplish with each session for families. See attached sample, Figure A, below as a guide. Family engagement sessions should be no more than 20 to 30 minutes focused on assisting families in teaching their children at home.
- Be practical. Online learning as a tool for family engagement is new. Start small and expand.
- Network with other teachers and colleagues to develop to develop plans and share across the system.
- Consider the developmental needs of all children and their families as you develop the plan.
- Attend a training on Google Hangouts.
- Collect feedback. Develop a brief poll or survey to collect feedback from families. Use the feedback to identify additional resources families need and as a tool to revise any areas in that need to improve.
- Develop a family engagement schedule and calendar of activities. Let families know the frequency of family engagement sessions, weekly, daily or bi-weekly.
- Create an engaging and easily remembered session title such as Family Fun at a Distance, Homebound Learning for All, etc.
- View parents and families as a Learning Hero[1], charged with supporting learning at home!

Figure A. Family Engagement Online Session Planning Tool

SESSION COMPONENTS	DESCRIPTION	RESOURCES	TIME
Know It	• Identify the milestone and skill you would like families to aid in developing based on the District's Early Learning Standards and developmentally appropriate practices. • Provide background information on the session.	• Center for Disease Control (CDC) has the Developmental Milestones curriculum, CDC's Developmental Milestones. The site provides information on developmental milestones for children 2 months to 5 years of age. • Office of Head Start has developed a series of practice guides designed to aid teachers and families in improving their interactions with children. Practice Guides	10 minutes
See It	• Demonstrate the skill using a live presentation or video. • Identify the resources used.	• The Head Start practice guides provides a host of videos on sample interactions based on the standards and milestones.	10 minutes
Try It	• Encourage families to try the activities at home each day. • Provide information on resources at little to no cost. • Encourage families to share pictures and videos of the activities on social media and with you. • Encourage families to provide feedback on the activity.	• Identify additional systems or platforms to share stories. • Develop a Facebook or Instagram account so families can share their Try It activities.	10 minutes
Revise It	• Revise the activity and share based on feedback received from families.	• Share revised plan with families.	

OSSE recommendations to families using DE

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EARLY

DISTANCE LEARNING MODEL REINFORCED WITH ROBOTICS FOR 3-7 YEARS OLD CHILDREN

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