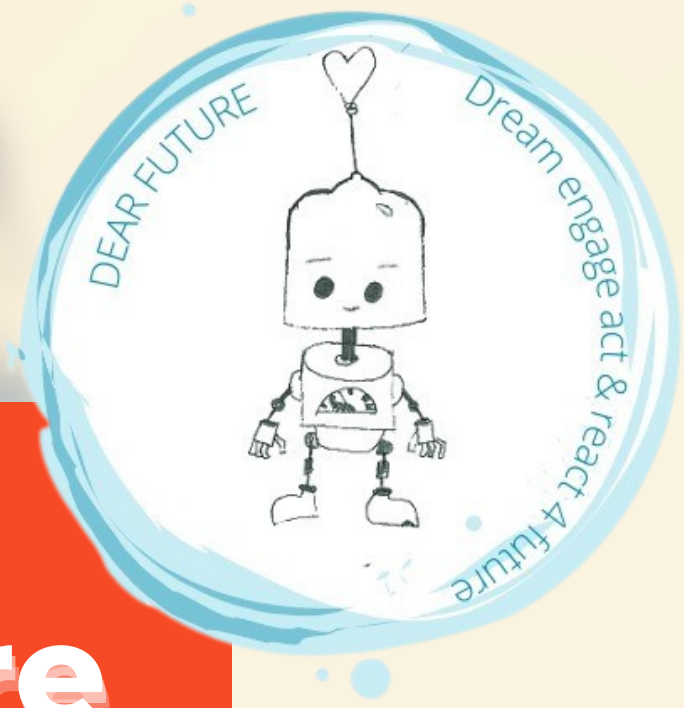

Dear Future E-book

Dream, Engage, Act and Re-act 4 the Future

Project name: *Dream, Engage, Act and Re-act 4 the Future*
Project no: 2021-2-PL01-KA220-SCH-000048581
Project acronym: *Dear Future*
Duration: *01/03/2022 - 31/12/2024*

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Authors: *Szkola Podstawowa im Wladyslawa Stanislawa Reymonta w Szczutowie, Agrupamento de Escolas de Barcelos, Základníškola Želiv, okres Pelhřimov, Detskagradina "Radost", Djecji Vrtic Varazdin, Eurasia*
Graphic Design: *Eurasia*
Design, Redaction & Production: *Eurasia*

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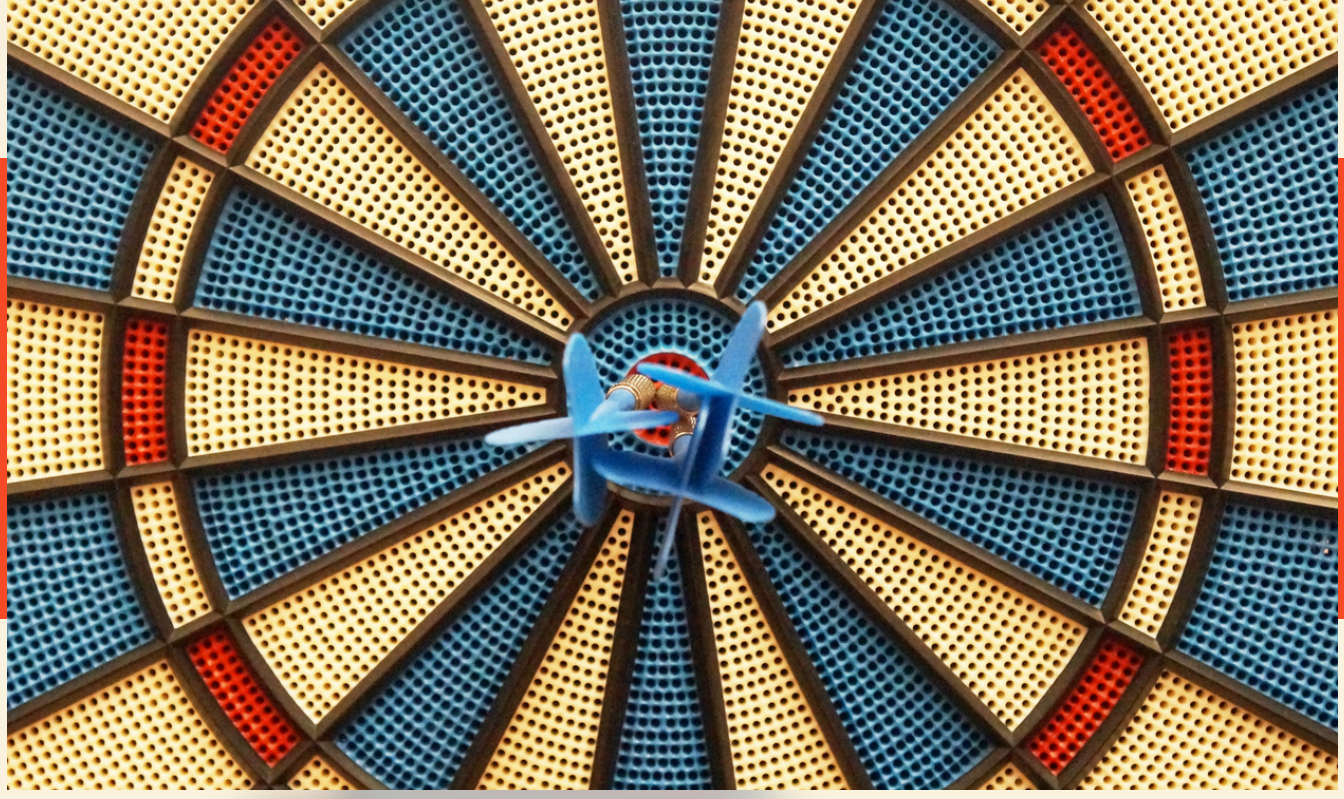
About the Project

We want to promote AI in pre-school education because 2021-2030 Early childhood education and care strategy stated that ‘’basic digital skills and competences from an early age is curtail because pre-school students are under a high development stage in both physically and cognitively’’. DEAR FUTURE consortium is aware that teaching AI is not easy because AI is very complex, inconcrete and new for pre-school students. So as to ease the complexity and reduce the abstraction of AI in teaching, we want to improve a novel approach. In this context, we want to promote AI through Game-based Interactive Storytelling (GIS) approach. We selected GIS because pre-school students better learn through games and stories.



Project Objectives

- To create, test and pilot a digital and innovative education package in pre-school education in teaching and learning Artificial Intelligence through a Game-based interactive storytelling approach;
- To educate and strengthen the profiles of pre-primary school teachers on how to teach AI through an innovative approach;
- To teach pre-school children (3-6 year-old) how to understand AI through an innovative approach;
- To cooperate with international actors to build the capacities of the participating organizations in the field of AI to promote Artificial Intelligence in pre-school education across the partner countries through an innovative approach;
- To raise awareness of the importance of AI in early childhood education;
- To cooperate and network with associations representing pre-schools, education entities, universities' pre-school and pedagogy departments, and NGOs linked to pre-school education to create a more modern, dynamic, commitment, future related AI education.

Partners

Szkola Podstawowa im Wladyslawa Stanislawa Reymonta w Szczutowie

Poland

Djecji Vrtic Varazdin

Croatia

Základníškola Želiv, okres Pelhřimov,

Czech Republic

Eurasia

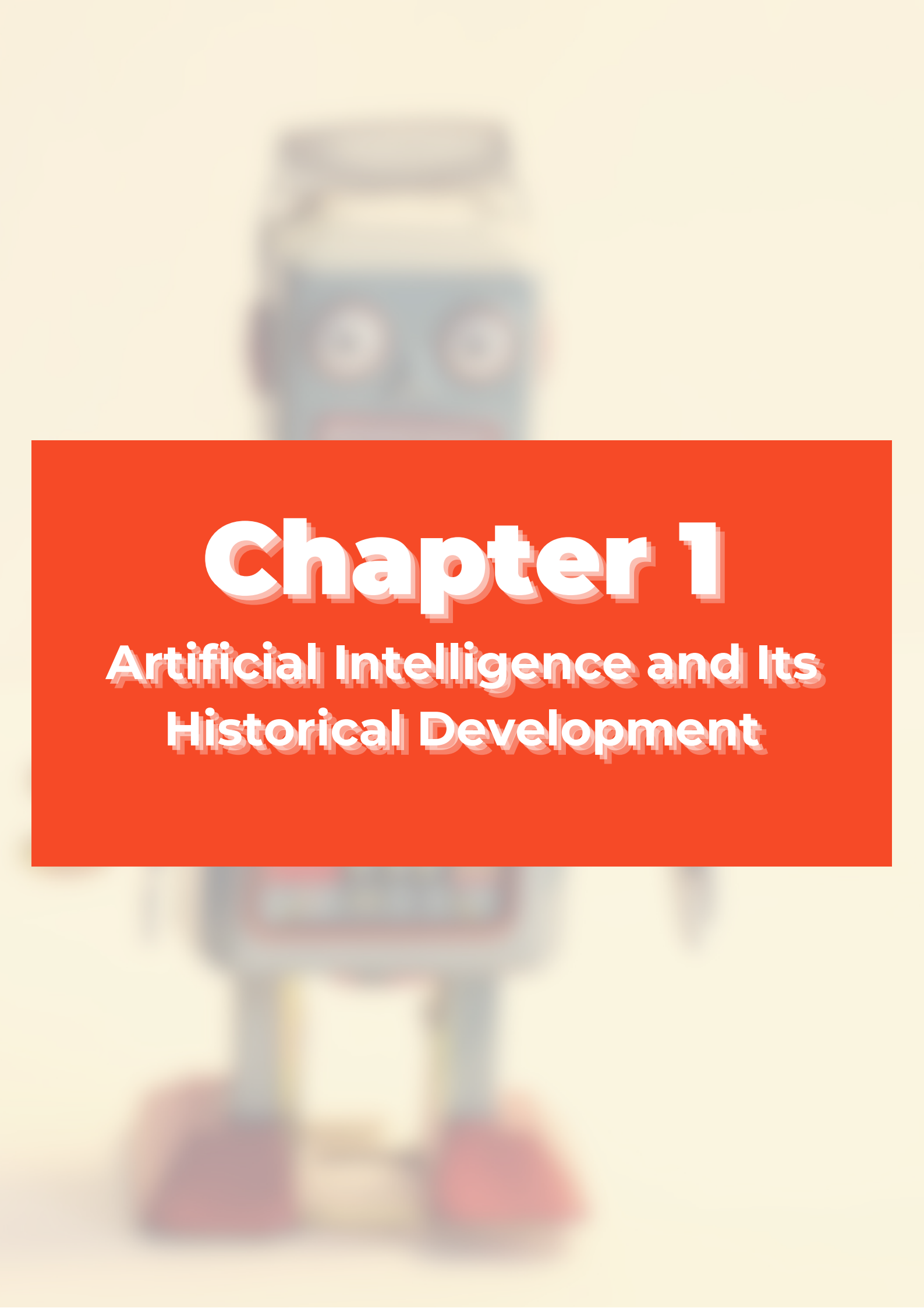
Turkey

Agrupamento de Escolas de Barcelos

Portugal

Detskagradina "Radost"

Bulgaria



Chapter 1

Artificial Intelligence and Its Historical Development

Learning Outcomes

- Distinguish between desirable and undesirable behaviors during learning;
- Using ready made internet sources for learning;
- Learning historical developments of AI

Introduction

Today's children very often start using smartphones or tablets earlier than they do with crayons and writing tools, and they also master the interface leading to their favorite animated movies and electronic games. Children from an early age grow up in the media space that shapes their behavior, imagination and the world of values. They function simultaneously in the real environment and in the virtual world. According to research, the majority of children (64%) aged up to 6.5 years use mobile devices (including 62% playing on a smartphone or tablet), some of them every day (25%). A similar number of children of this age (26%) have mobile devices. It is not without reason that this generation is called "children of the network".

The task of adults is to introduce children to the safe use of media technology, while understanding and recognizing its importance in their future everyday, educational, and professional life. At the same time, it is worth knowing the field of artificial intelligence much more broadly than just focusing on its application in practical educational or employee activities.

Historical Development

Although the term "artificial intelligence" was coined in 1956, it has gained popularity in the present day thanks to more data, advanced algorithms, and improvements in computing power and memory. Early AI research in the 1950s covered topics such as problem solving and symbolic methods

In the 1960s, the US Department of Defense became interested in this type of activity and began training computers to mimic basic human reasoning. The Defense Advanced Research Projects Agency (DARPA), for example, conducted street mapping projects in the 1970s.

In 2003, DARPA also created intelligent personal assistants, long before Siri, Alexa and Cortana became household names. These early efforts paved the way for the automation and formal reasoning we see in computers today, including decision support systems and intelligent search systems that can be designed to complement and augment human capabilities.

Historical Development

The history of artificial intelligence can be divided into several periods. Artificial intelligence inspires philosophical considerations and proves the validity of many concepts. The deep conviction that there may be a creative element in the machine - intelligence or awareness of existence, has been accompanying humanity since the beginning of time. Artificial intelligence has its own area of research, simultaneously using methods and techniques from many fields, both algorithmic and non-algorithmic. The classical trend is based on logical programming, while the current inspired by biology is based on research on the structure of the brain, an attempt to use genetic algorithms and the construction of artificial systems with a structure similar to the structure of the human brain's neuronal network.

Already in the mid-50s of the 20th century, the first ideas of creating artificial intelligence appeared, i.e. solving problems for which there is no algorithm leading to a solution. The ambitious projects of Allen Newell and Herbert Simon, including the "General Problem Solver" and others, did not lead to the creation of universal intelligent programs, but they helped to better understand the complexity of the problem and the nature of intelligence. At that time, much attention was paid to the field of logic and the ways of logical understanding. Artificial intelligence was looking for a thinking algorithm and general rules for solving problems modeled on natural human activities and cognitive processes, using computer programs that stimulate them.

20th Century

About 20 years after Polish cryptologists from the University of Poznań broke the codes of the German Enigma cipher machine, the British mathematician Alan Turing asked the question: "Can machines think?" In his article "Computing Machinery and Intelligence" (1950), he outlined the basic purpose and vision of artificial intelligence. Its main task was to create a substitute for the human mind.

Polish cryptologists were the first to oppose the German Enigma encryption machine to other machines. CSE has also prepared an exhibition that presents the IT revolution that took place after World War II thanks to the hard work of cryptologists. This revolution continues to this day, i.e. to the era in which artificial intelligence is developing so dynamically.

21st Century

On the other hand, during the second decade of the 21st century, many spectacular solutions were developed demonstrating the enormous potential of artificial intelligence, including the following: In 2016, the Google DeepMind AlphaGo team defeated the world champion in Go Lee Sadol. The complexity of the ancient Chinese game was previously recognized as a major challenge for AI. In 2016, Hanson Robotics developed the first humanoid robot called Sophia, which was capable of facial recognition, verbal communication, and facial expression expression. In 2018, Waymo launched the Waymo One service, which allowed users located in the metropolitan area of Phoenix, Arizona, to use self-driving cars.

The Artificial Intelligence: Timeline

1918

Prehistoric era for artificial intelligence. The period of the original patterns of artificial intelligence, from the appearance of the first analytical machine by Charles Babbage (1842) to around 1940, when programmable computers appeared.

1938

The period of development of formal logic and the emergence of scientists' interest in experimental psychology as one of the fields included in the construction of the interdisciplinary field of artificial intelligence.

1954

The first computer project is created. People with the greatest contribution to the development of artificial intelligence were H. Simon "Administrative Behavior", N. Wiener "Cybernetics", A. M. Turing "Computing Machinery and Intelligence", Macy - Cybernetics Conference, McCulloch and Pitts - researchers of perceptron and neurosimilar networks.

1960

The increase in the capabilities of computers, with the simultaneous development of programming languages. Paying attention to the psychology of information processing. The first programming language "Information Processing Language (IPL – I)" is created.

1970

So-called the romantic era of artificial intelligence (1961 – 1965), when it was predicted that artificial intelligence would achieve its goals within 10 years. There have been many initial successes. The activities of H. Simon who wrote "Human Problem Solving«; The LISP programming language is born; Heuristics (Shanon, Turing), robotics and chess programs are developed. The activities of H. Simon who wrote "Human Problem Solving«; The LISP programming language is born; Heuristics (Shanon, Turing), robotics and chess programs are developed.

1980

So-called renaissance of artificial intelligence (1971 – 1975). Building the first integrated processors and consulting systems: MYCIN - Shorliffe (Stanford University), HEARSAY II (Cornegie - Mellon), MACSYMA (MIT). Development of structured programming. The period of perfecting knowledge engineering of artificial intelligence (Minsky, Feigenbaum). EMYCIN, GUIDON (Stanford University) systems are created. A programming language is created in the logic of the so- called Prologue.

1990

The commercial sale of the advisory systems and their universal luminaires begins. Object-oriented technology, neuro-like networks and image recognition methods are developing. Learning machines appear - D. Lenat (Samuel, McCarthy) and the Eurisco and Prospector systems (SRI). The Japanese Fifth Generation Computer Project takes place.

Since 1990

There is a development of cognitive sciences, 3D graphics, computer networks, virtual reality, CSCW group cooperation systems, scripting languages. The virtual VRML protocol is created. There is a development of computer methods in natural language and speech recognition.

Chapter 2

Artificial Intelligence and Policies in the EU

Learning Outcomes

- EU policies on AI;
- EU regulations;

Introduction

Artificial intelligence (AI) is a rapidly evolving family of technologies capable of delivering a wide range of economic and societal benefits across a range of industries and societal activities. By improving forecasts, optimizing operations and resource allocation, and personalizing service delivery, the use of artificial intelligence can contribute to beneficial outcomes for society and the environment, and provide competitive advantages for businesses and the European economy. Such action is particularly needed in high-impact sectors, including climate change, environment and health, public sector, finance, mobility, home affairs and agriculture. However, the same elements and techniques that produce the socio-economic benefits of AI can also bring new risks or negative consequences for citizens and society. In light of the speed of technological change and the potential challenges, the EU is committed to achieving a balanced approach. It is in the Union's interest to preserve the EU's technological leadership and to ensure that new technologies, developed and operated in accordance with the values, fundamental rights and principles of the Union, are at the service of European citizens.

Introduction - I

President Ursula von der Leyen, who announced in her Political Guidelines for 2019-2024, entitled "A more ambitious Union" , that the Commission would present a legislative proposal for a coordinated European approach to the implications humanities and ethics of artificial intelligence. Following that announcement, the Commission published, on 19 February 2020, the White Paper on Artificial Intelligence — A European Approach for Excellence and Trust. The White Paper sets out policy options on how to achieve the twin goals of promoting the uptake of AI and addressing the risks associated with certain uses of this technology. This proposal aims to implement the second objective by developing a trust ecosystem by proposing a legal framework for trust AI. The proposal is based on EU values and fundamental rights and aims to give people and other users the confidence to adopt AI-based solutions, while encouraging companies to develop them. Artificial intelligence must be a tool at the service of people and a positive force for society with the ultimate goal of increasing the well-being of human beings. The rules applicable to artificial intelligence technologies made available on the market in the Union or which affect people in the Union should therefore be human-centered, so that people can trust that the technology is used in a safe way and in compliance with the law, including respect for fundamental rights.

Regulatory Framework

- Ensure that AI systems placed on the Union market and used are safe and comply with existing legislation on fundamental rights and Union values,
- Ensure legal certainty to facilitate investments and innovation in the field of AI,
- Facilitate the development of single market,

- Improve governance and effective enforcement of existing legislation on fundamental rights and security requirements applicable to AI systems.

An European Approach

The EU's approach to artificial intelligence centers on excellence and trust, aiming to boost research and industrial capacity while ensuring safety and fundamental rights.

The way we approach Artificial Intelligence (AI) will define the world we live in the future. To help building a resilient Europe for the Digital Decade, people and businesses should be able to enjoy the benefits of AI while feeling safe and protected.

The European AI Strategy aims at making the EU a world-class hub for AI and ensuring that AI is human-centric and trustworthy. Such an objective translates into the European approach to excellence and trust through concrete rules and actions.

An European Approach - I

In April 2021, the Commission presented its AI package, including:

- its Communication on fostering a European approach to AI;
- a review of the Coordinated Plan on Artificial Intelligence (with EU Member States);
- its proposal for a regulation laying down harmonised rules on AI (AI Act) and relevant Impact assessment.

Fostering excellence in AI will strengthen Europe's potential to compete globally.

The EU will achieve this by:

1. enabling the development and uptake of AI in the EU;
2. making the EU the place where AI thrives from the lab to the market;
3. ensuring that AI works for people and is a force for good in society;
4. building strategic leadership in high-impact sectors.

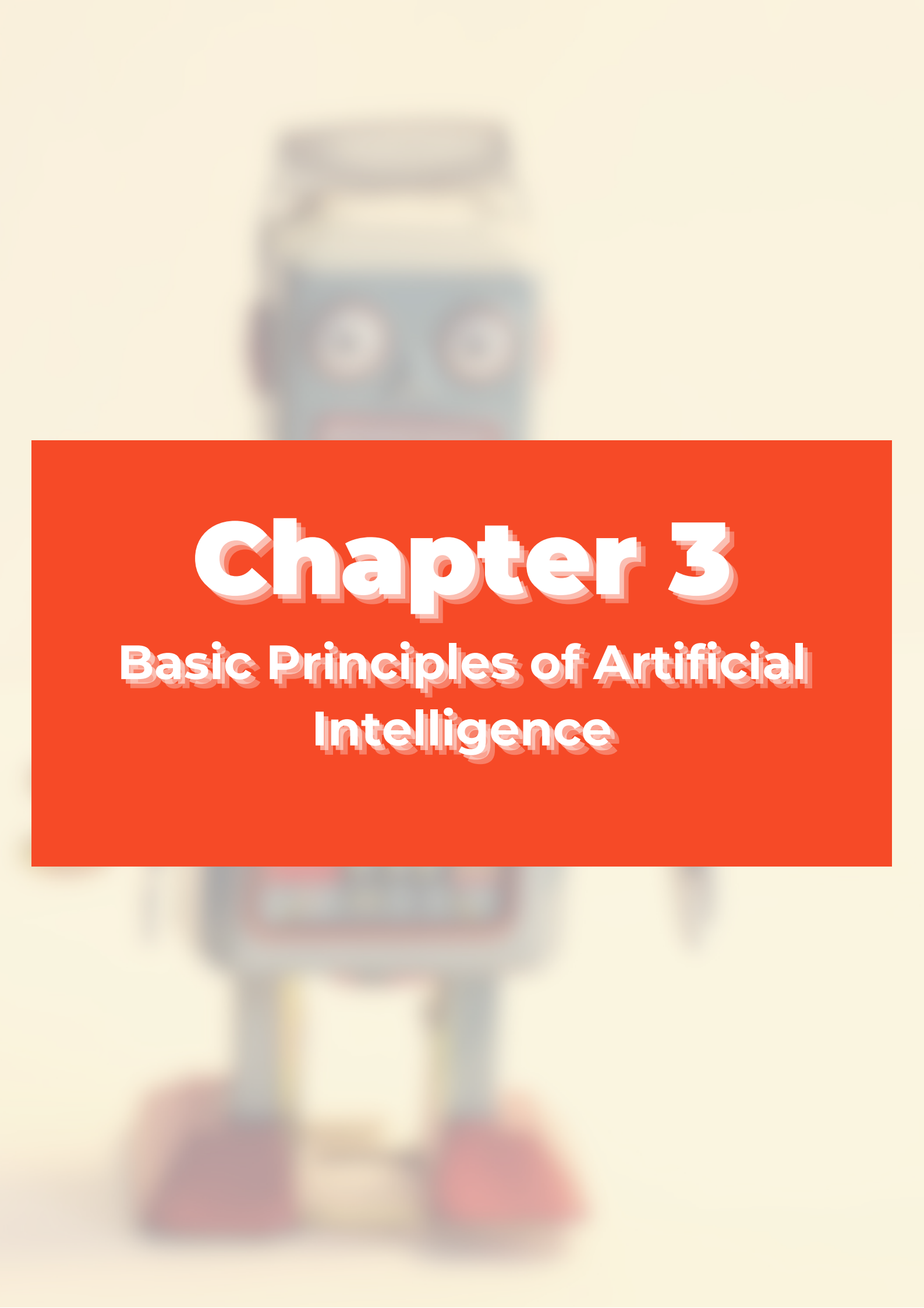
The Commission and Member States agreed to boost excellence in AI by joining forces on policy and investments. The 2021 review of the Coordinated Plan on AI outlines a vision to accelerate, act, and align priorities with the current European and global AI landscape and bring AI strategy into action.

An European Approach - II

Maximising resources and coordinating investments is a critical component of AI excellence. Through the Horizon Europe and Digital Europe programmes, the Commission plans to invest €1 billion per year in AI. It will mobilise additional investments from the private sector and the Member States in order to reach an annual investment volume of €20 billion over the course of the digital decade.

The Recovery and Resilience Facility makes €134 billion available for digital. This will be a game-changer, allowing Europe to amplify its ambitions and become a global leader in developing cutting-edge, trustworthy AI.

Access to high quality data is an essential factor in building high performance, robust AI systems. Initiatives such as the EU Cybersecurity Strategy, the Digital Services Act and the Digital Markets Act, and the Data Governance Act provide the right infrastructure for building such systems.



Chapter 3

Basic Principles of Artificial Intelligence

Learning Outcomes

- Understand the the meaning and benefit of applying AI in educational activities;
- Use the AI products;
- Evaluate the benefits through the knowledge.

Introduction

Artificial intelligence marks a new beginning in the evolution of humanity. It is capable of completely changing the traditional way of functioning of any society. It is undeniable that artificial intelligence is a huge step forward in both scientific and technological terms and is able to contribute significantly to the development and modernization of many spheres of human life. To take advantage of this, however, there must be guarantees for the security and efficiency of these systems, and these can only be ensured by creating a legal framework based on ethical values and human rights.

On May 22, 2019, member countries of the Organization for Economic Co-operation and Development (OECD) adopted the Principles for Artificial Intelligence, the international standards that aim to ensure that artificial intelligence systems are designed to be reliable and secure.

Introduction - II

The Organization for Economic Co-operation and Development (OECD) AI Principles set out standards for artificial intelligence that are practical and flexible enough to stand the test of time in a rapidly evolving field. They complement existing standards in areas such as privacy, digital security risk management and responsible business conduct.

There are five values-based principles for the responsible deployment of trustworthy AI and five recommendations for governments. They aim to guide governments, organizations and individuals in designing and managing artificial intelligence systems in a way that puts people's interests first and ensures that developers and operators are accountable for their proper functioning.

1) Inclusive growth, sustainable development and well-being
2) Human-centered values and fairness
3) Transparency and explainability
4) Robustness, security and safety
5) Accountability

1st Principle: Inclusive Growth, Sustainable Development and Well-being

This principle highlights the potential for trustworthy AI to contribute to overall growth and prosperity for all – individuals, society, and planet – and advance global development objectives.

This principle recognises that guiding the development and use of AI toward prosperity and beneficial outcomes for people and planet is a priority. Trustworthy AI can play an important role in advancing inclusive growth, sustainable development and well-being and global development objectives. Indeed, AI can be leveraged for social good and can substantially contribute to achieving the Sustainable Development Goals (SDGs) in areas such as education, health, transport, agriculture, environment, and sustainable cities, among others.

2nd Principle: Human Centered Values and Fairness

AI systems should be designed in a way that respects the rule of law, human rights, democratic values and diversity, and should include appropriate safeguards to ensure a fair and just society.

AI should be developed consistent with human-centred values, such as fundamental freedoms, equality, fairness, rule of law, social justice, data protection and privacy, as well as consumer rights and commercial fairness.

Some applications or uses of AI systems have implications for human rights, including risks that human rights (as defined in the Universal Declaration of Human Rights)1 and human-centred values might be deliberately or accidently infringed. It is therefore important to promote “values-alignment” in AI systems , i.e., their design with appropriate safeguards.

3rd Principle: Transparency and Explainability

This principle is about transparency and responsible disclosure around AI systems to ensure that people understand when they are engaging with them and can challenge outcomes.

The term transparency carries multiple meanings. In the context of this Principle, the focus is first on disclosing when AI is being used (in a prediction, recommendation or decision, or that the user is interacting directly with an AI-agent, such as a chatbot). Disclosure should be made with proportion to the importance of the interaction. The growing ubiquity of AI applications may influence the desirability, effectiveness or feasibility of disclosure in some cases.

Transparency further means enabling people to understand how an AI system is developed, trained, operates, and deployed in the relevant application domain, so that consumers, for example, can make more informed choices.

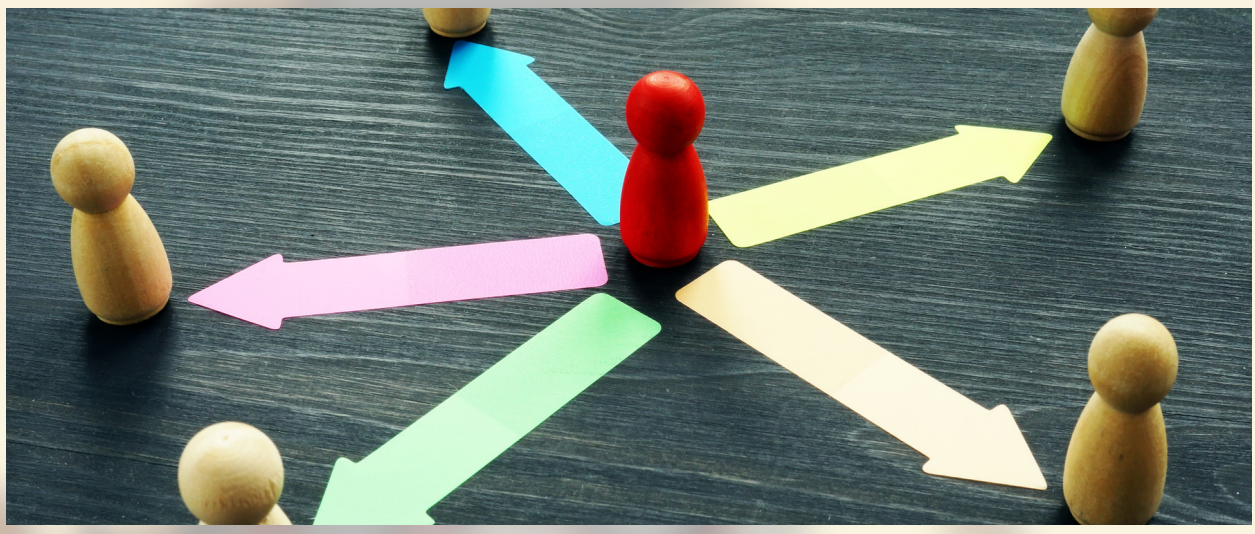
4th Principle: Robustness, Security and Safety

AI systems must function in a robust, secure and safe way throughout their lifetimes, and potential risks should be continually assessed and managed.

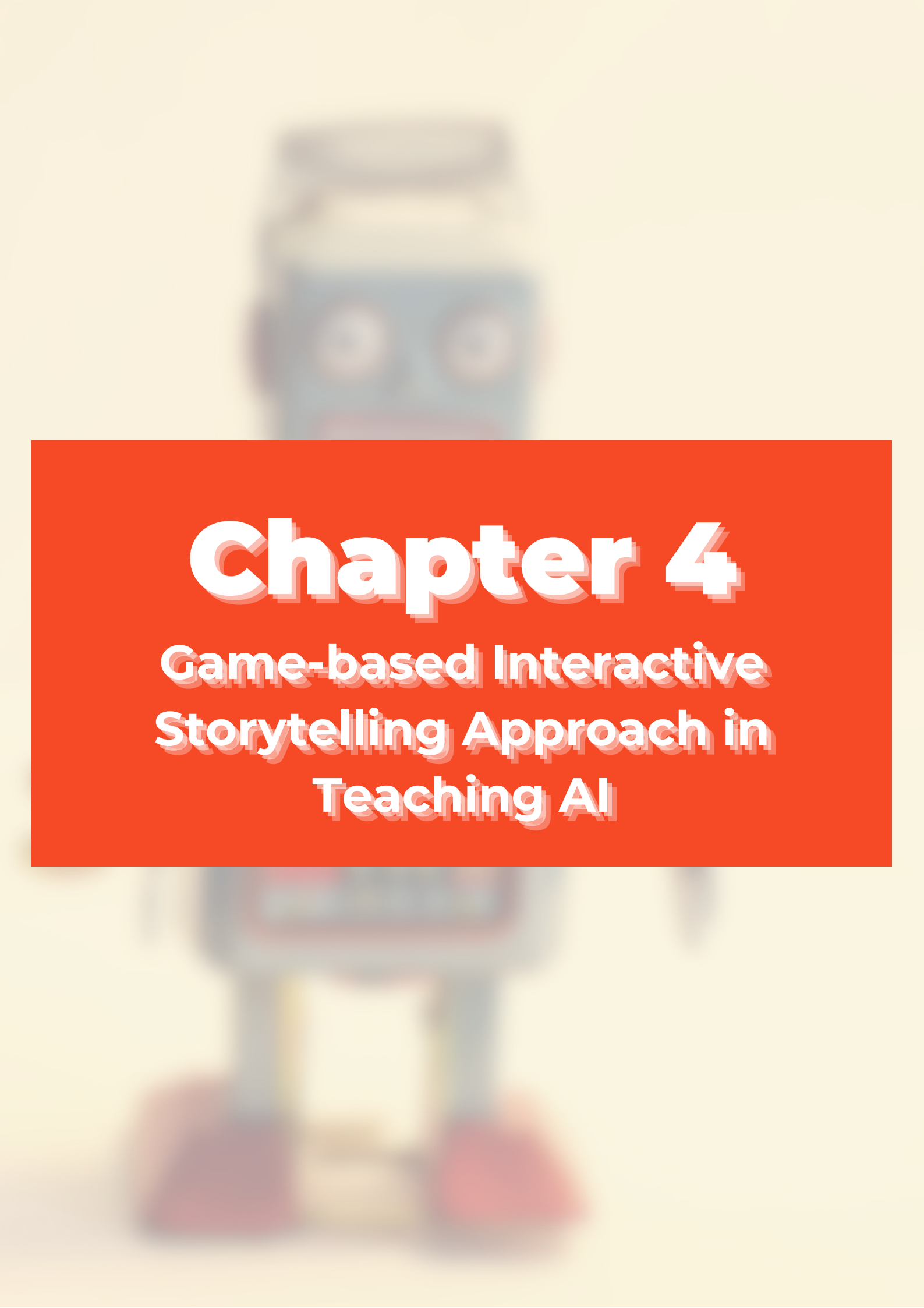
Addressing the safety and security challenges of complex AI systems is critical to fostering trust in AI. In this context, robustness signifies the ability to withstand or overcome adverse conditions, including digital security risks. This principle further states that AI systems should not pose unreasonable safety risks including to physical security, in conditions of normal or foreseeable use or misuse throughout their lifecycle. Existing laws and regulations in areas such as consumer protection already identify what constitutes unreasonable safety risks. Governments in consultation with stakeholders must determine to what extent they apply to AI systems.

5th Principle: Accountability

Organisations and individuals developing, deploying or operating AI systems should be held accountable for their proper functioning in line with the OECD's values-based principles for AI.



The terms accountability, responsibility and liability are closely related yet different, and also carry different meanings across cultures and languages. Generally speaking, "accountability" implies an ethical, moral, or other expectation, that guides individuals' or organisations' actions or conduct and allows them to explain reasons for which decisions and actions were taken. In the case of a negative outcome, it also implies taking action to ensure a better outcome in the future. "Liability" generally refers to adverse legal implications arising from a person's (or an organisation's) actions or inaction. "Responsibility" can also have ethical or moral expectations and can be used in both legal and non- legal contexts to refer to a causal link between an actor and an outcome.



Chapter 4

Game-based Interactive Storytelling Approach in Teaching AI

Learning Outcomes

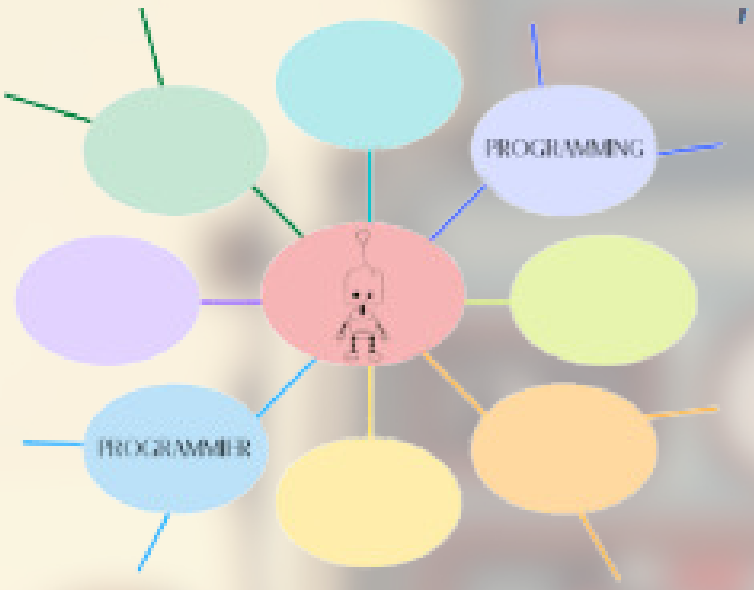
- Understand how the robot works;
- Use constructs a course of action for the robot to reach the goal;
- Evaluate the wrong procedure for the robot.

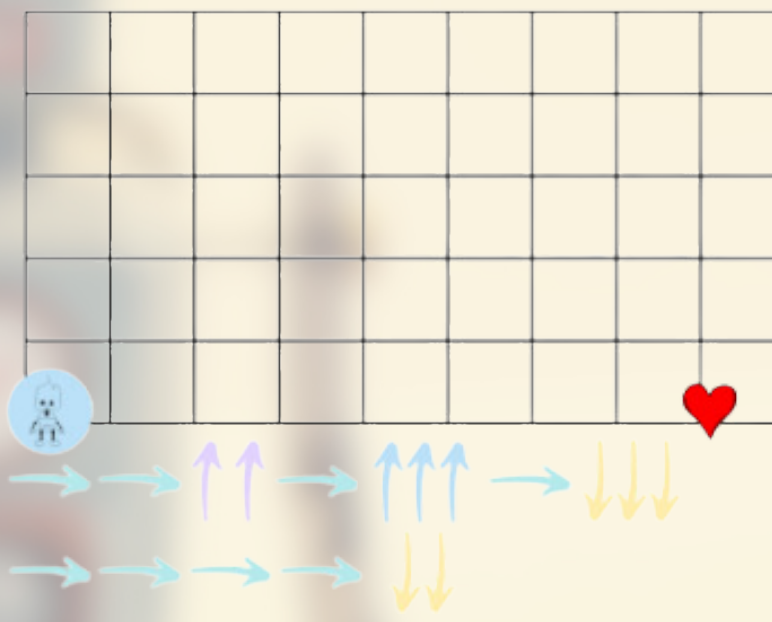
Lesson no1: Meet Albert

Brainstorming – Questions – Mind map

- Do you know what is a robot?
- How does the robot work?
- What does it mean "programming"?
- Where can we meet with this word (with programming)?
- Why must we learn programming?
- Who is a programmer?
- What things does a programmer do?

Lesson no1





Travelling in the web – part one

1. TPR motivation: Children will become robots after saying the spell:

Electron shut on.

The wires tighten in the head.

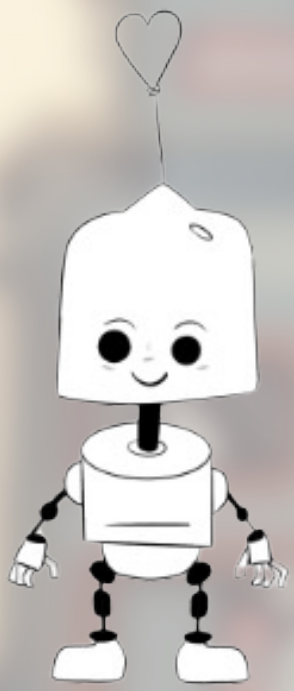
Battery, circuit,

Make me a robot.

2. After this children move around the class as robots and we give them instructions:

Our robot lost his heart antenna. Can you find it? Be careful, robots must follow the arrows.

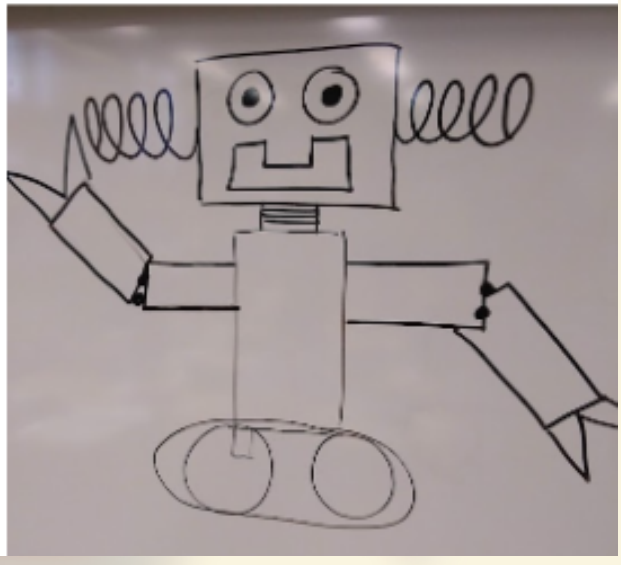
Lesson no2



Drawing dictation (CLIL English – shapes, colours, numbers)

My body is a big .....rectangle. (complete colour as you want)
Instead of legs I have got two .....wheels.
My arms are two connected .....rectangles with two fingers.
My head is a .....square. I have got two eyes and a square mouth.
I haven' t a nose and my ears look like springs.

Lesson no2



Reflection Activity

Control your work together!

Lesson no2

Travelling in the web – part two

1. TPR motivation: Children will become robots after saying the spell:

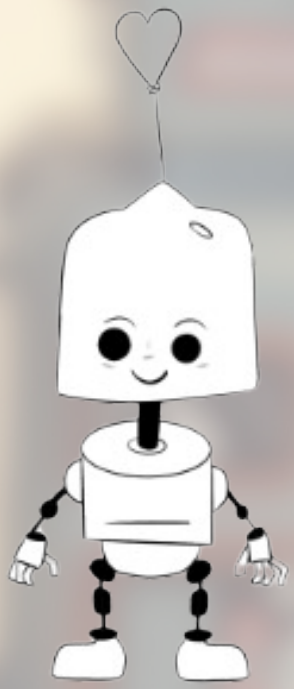
Electron shut on.
The wires tighten in the head.
Battery, circuit,
Make me a robot.

2. After this children move around the class as robots and we give them instructions.

3. Work in pairs. One of you is a robot and one will be a programmer:

You will use paper arrows and prepare ways in the webs.
You find ways to your robot heart.
Arrows move in front of your web into one line.
One of you is a robot and move in the web. One is a programmer and tells you the way you two programmed.

Lesson no3



Meet my friends:
Bluebots

Drawing dictation (CLIL English – shapes, colours, numbers)

My body is a big .....rectangle. (complete colour as you want)
Instead of legs I have got two .....wheels.
My arms are two connected .....rectangles with two fingers.
My head is a .....square. I have got two eyes and a square mouth.
I haven' t a nose and my ears look like springs.

Lesson no3

Travelling in the web – part three

1. TPR motivation: Children will become robots after saying the spell.

Electron shut on.
The wires tighten in the head.
Battery, circuit,
Make me a robot.

2. After this children move around the class as robots and we give them instructions.

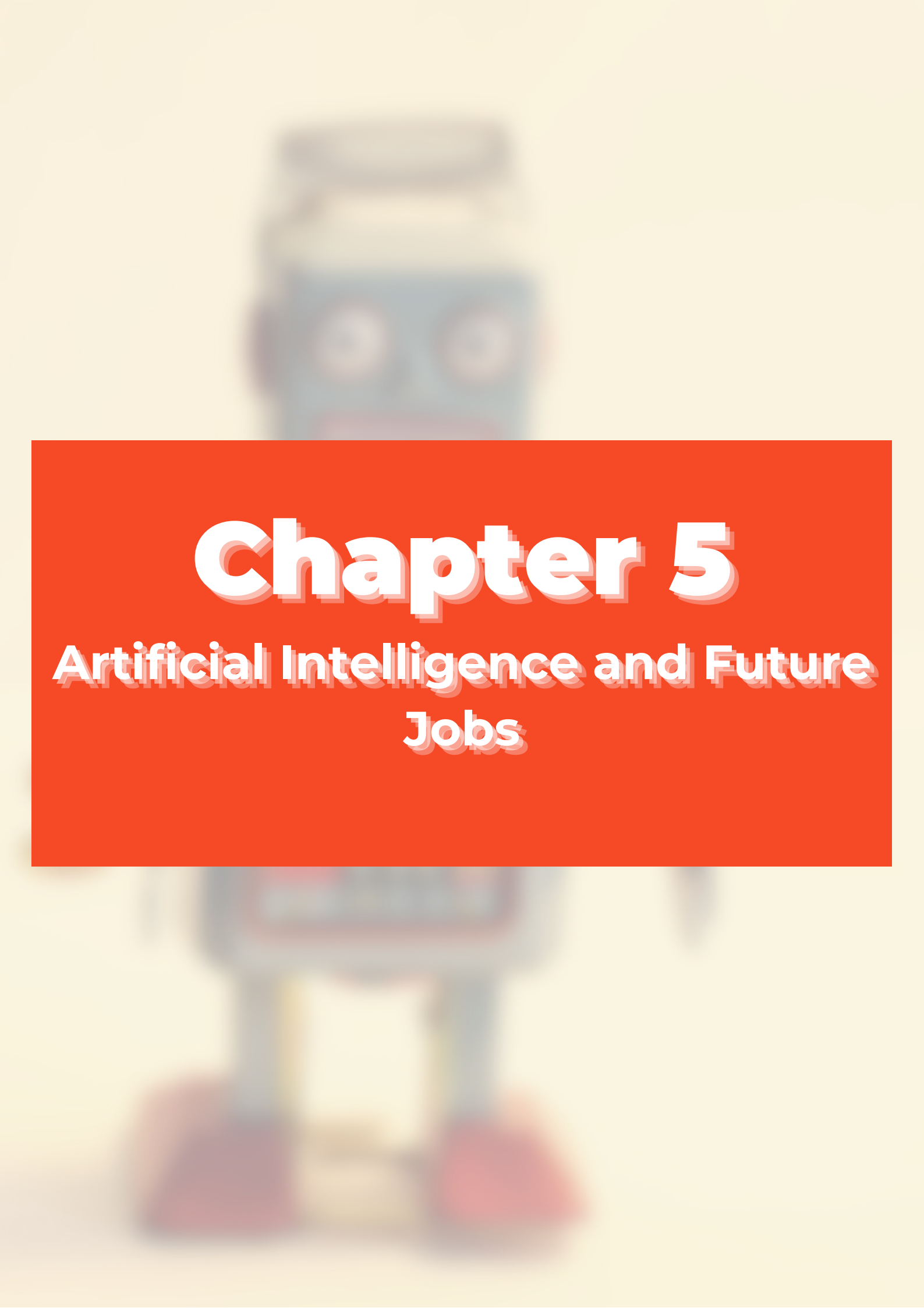
3. Work own.

You will use arrows and prepare ways on transparent mat with pockets for your bluebot. You find way to your robot heart.
Arrows move in front of your web into one line.
Command your bluebot.
Watch your bluebot's track.

Lesson no3

Reflection Activity

Was your bluebot's way right?



Chapter 5

Artificial Intelligence and Future Jobs

Learning Outcomes

- Understand the job opportunities that AI provides;
- Get information about AI future job opportunities;
- Speak about basics of sectoral requirements

Introduction

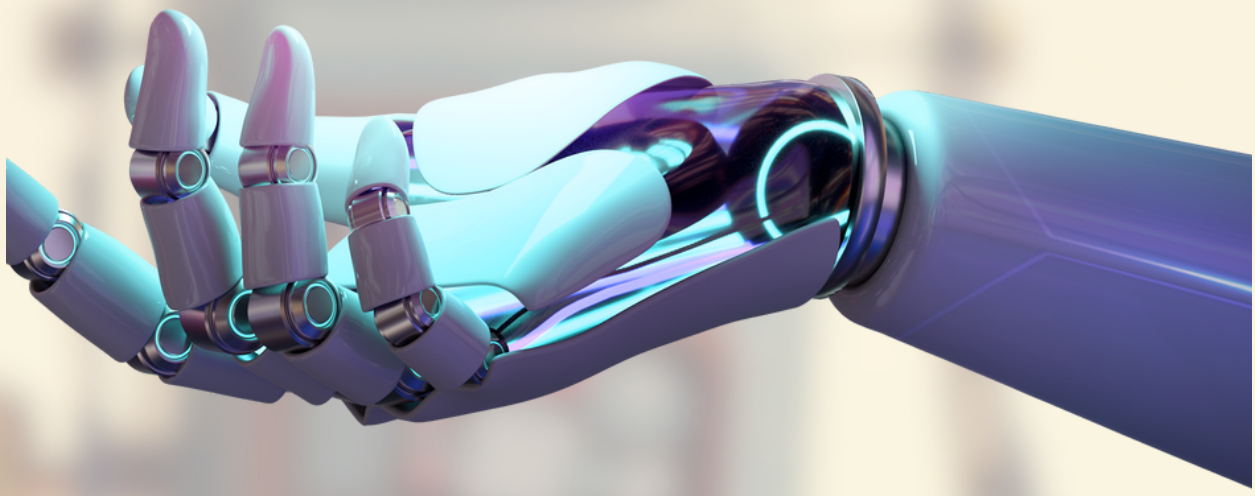
The supply of the labor market and the demand for workers, as well as their employment and layoff, represent the elements of the labor market. The opening of the borders also opens up greater employment opportunities, but also greater competition, and thus the insecurity of jobs. The development of technology leads to a new way of working. More and more companies are working from home. In this they see relief for the costs of utilities. With just one day a week when the office is closed and workers work from home, energy savings are achieved, which is a common place in thinking about the future and the use of alternative energy sources. A worker who does not work on a machine in a factory or educators who work in a kindergarten cannot of course work from home, but there are more and more workplaces where work is done using computers and the Internet. It seems that such professions are at an advantage because by working from home they can achieve savings not only for their employer but also for themselves.

Introduction - I

At the same time, the challenge of preserving other jobs that are inevitably threatened by other people's work from home arises here: a tram, train and bus driver, a seller in a bakery near companies whose workers partly work from home, etc. By opening borders, it is increasingly easier to look for a job in a neighboring country in where economic conditions are better, and the labor market offers greater opportunities. But what are the professions that can provide us with easy employment in the future? By reviewing the data available on the Internet about the best-paid jobs in the world, as well as in Europe, the top ten occupations are, without exception, software engineer, JavaScript developer, project manager, cloud engineer, clerical officer, solution architect. All these professions are from the field of AI, it is certain that such a trend will continue in the future. Namely, AI is included in more and more jobs, and experts in the field of AI are still in demand today and have no difficulties with employment in almost all parts of the world.

AI and Future Jobs in the EU

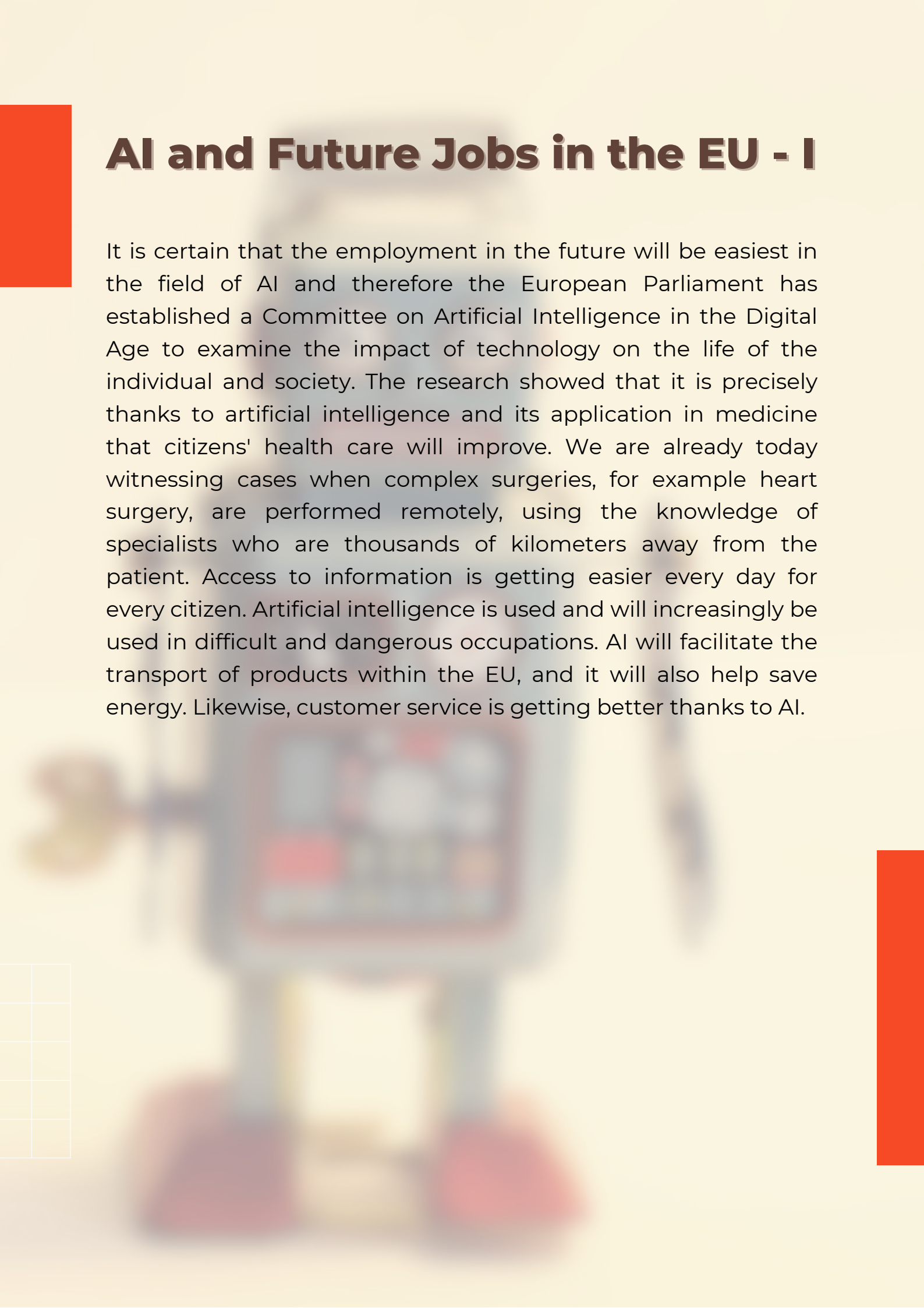
Eurostat estimates that there were almost 13 million unemployed in July 2022, which is a slight decrease in unemployment compared to the previous year. Unemployment is highest in Spain and France, while the Czech Republic and Poland have the lowest unemployment rates. In Croatia, the unemployment rate is 6%. The fact that the rate of unemployed young people is twice as high as the general unemployment rate is worrying, and women are also a more vulnerable group and 15 percent less employed than men.



The increase in life expectancy, but also the decrease in the birth rate in the EU, leads to an aging population, and thus to a decrease in the number of workers. It is expected that the number of employed adults will decrease by about 15% in the next 50 years. A simple calculation shows the following: in 2050, the ratio of employees to retirees will be 1:2, which is an alarming figure. Europe sees the solution in lifelong learning, but also in quality education for the needs of the labor market and in reducing the rate of early withdrawal from education. Today's data show that as many as 16 percent of young people drop out of education, especially in Mediterranean countries. On the other hand, in the developed democracies of Northern Europe, this rate is minimal, as well as in some countries of Central and Eastern Europe.

AI and Future Jobs in the EU - I

It is certain that the employment in the future will be easiest in the field of AI and therefore the European Parliament has established a Committee on Artificial Intelligence in the Digital Age to examine the impact of technology on the life of the individual and society. The research showed that it is precisely thanks to artificial intelligence and its application in medicine that citizens' health care will improve. We are already today witnessing cases when complex surgeries, for example heart surgery, are performed remotely, using the knowledge of specialists who are thousands of kilometers away from the patient. Access to information is getting easier every day for every citizen. Artificial intelligence is used and will increasingly be used in difficult and dangerous occupations. AI will facilitate the transport of products within the EU, and it will also help save energy. Likewise, customer service is getting better thanks to AI.



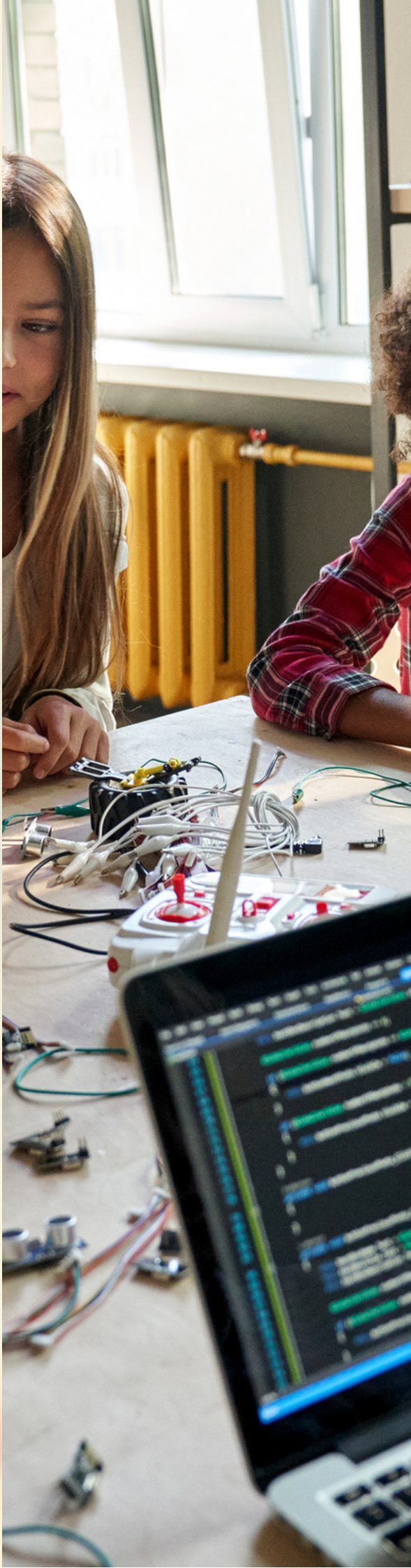
AI and Future Jobs in the EU - II

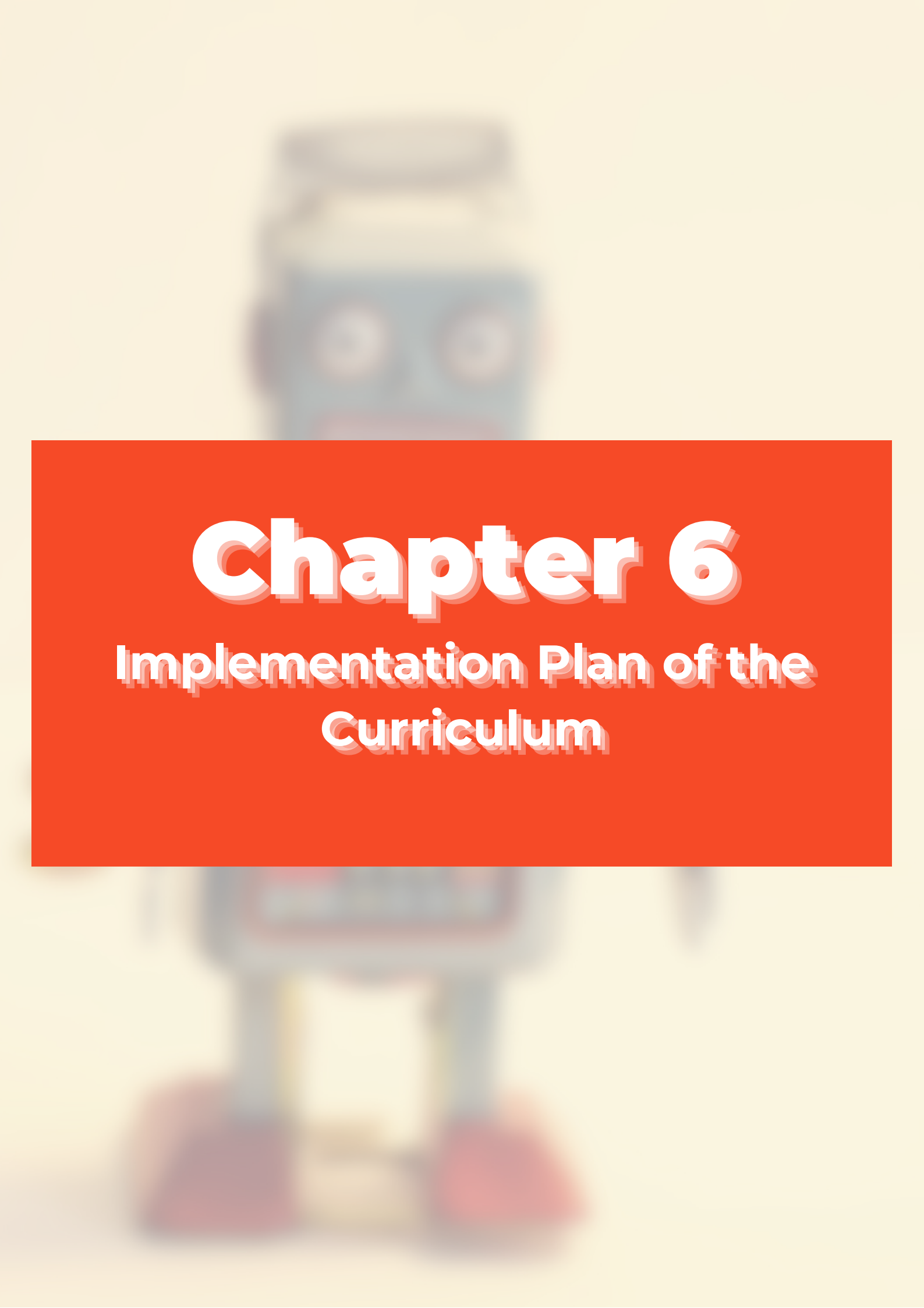
However, artificial intelligence also has challenges that we will certainly face in the near future. For example, fast checkouts in stores, which the customer uses himself, really speed up the service, but at the same time endanger the job of the cashier. If AI is not used wisely, it can lead to layoffs. One of the dangers is certainly the impact of AI on democratic processes. AI can contribute to creating a false image based on past online behavior, but also contribute to realistic fake videos and images.

Artificial intelligence will create a number of new jobs in the future, but it can also contribute to the elimination of a large number of jobs. The ways in which we will use artificial intelligence in our future depends on us, and therefore the education systems of individual countries are responsible for creating responsible users of the Internet and various web tools, as well as for educating the necessary experts in the field of AI.

Education and AI

As the future of the labor market in Europe is uncertain, the educational systems have a great responsibility to contribute to the workforce with quality programs in the field of AI, which would help today's children in their competitiveness on the labor market in twenty years. It is certain that a large number of jobs will be provided for experts in the field of AI, and such jobs should be created from their inclusion in the education system, from the time they start kindergarten. Of course, a child of preschool age should learn through play, using various web tools appropriate to his age and his competences. For that, we first need well-educated teachers in the field we want to teach. Lifelong learning becomes an obligation, even after completing formal education, teachers need to continuously educate themselves in order to respond as competently as possible to the demand for education of the youngest who are already growing up surrounded by artificial intelligence.





Chapter 6

Implementation Plan of the Curriculum

Introduction

Artificial intelligence is the main resource of growth and innovation across all the industries, education sector is not any different. According to the study of eLearning Industry, around 47% of learning management tools linked to AI capabilities will be utilized in the next three years.

AI-supported solutions have always been around, however; the industry has been slow to catch up and integrate new tools into the sector. Pandemic was arguably the worst experience humanity has experienced in the last decade, and if we need to take one positive from it, it should be transformation of educational landscape. Professors were forced to switch from conventional way of teaching to virtual learning. At the first place, it was forced, but now 86% of educators states that technology should be a core part of education. AI has the capability to optimize both learning and teaching while benefiting students and teachers simultaneously.

Introduction - II

Storytelling is a proven method in education sector even before technology has found its place in it. As a matter of fact, MacDonald (1998) explained in his study that societies have utilized the storytelling in order teach. Along the same line, Andrews et al. (2009) indicates that storytelling is in the frame of education of all kinds, dentistry, general medicine, law and business.

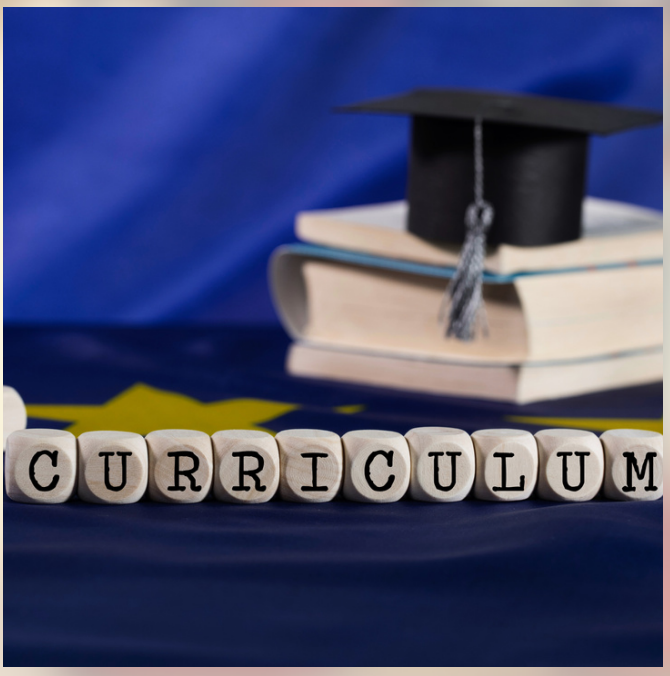
With the involvement of technology in our lives in this century, storytelling has equipped a novel shape. Integration of digital media like videos, audio files, as well as images are occurred to be chief part of the method entitled intellectual storytelling. However, it is not limited to these elements, maps and social elements such as tweets might be utilized. Classrooms welcome intellectual storytelling more and more. According to Smeda et al. (2014), digital storytelling is an innovative pedagogical approach that can engage students in deep and meaningful learning".

Furthermore, digital story telling has proved its potential as a powerful teaching and learning tool for engaging both teachers and students (Robin, 2008). Professors and instructors could capitalize intellectual stories in order to generate interest and engagement of the students. Possibility of resorting to diverse learning styles is another factor for increasing interest in the class and gaining new skillsets such as synthesis, analysis and evaluation.

As it might be understood from two previous methods, textbook-only learning is old fashioned. Game-based learning (GBL) is another perspective and is becoming increasingly popular to assist students on the path of reaching teaching objectives. It benefits from power and creativity of games to achieve learning outcomes in a remarkably different way. It reaches its objectives through educational games such as engagement, immediate rewards and healthy competition. Therefore, students stay motivated to learn while having fun.

Aim of the Curriculum

The 2021-27 Digital Education Action Plan (DEAP) indicates that AI in teacher training is fundamental for future development. The DEAP indicates that since the teachers are at the stage of teaching, and the first resource for the students, empowering them and strengthening their profiles is a must. Our research carried out by the consortium members among pre-school teachers indicates that growing up with the ICT is not enough to develop the digital skills needed for raising the new generation.



Facing the new societal and digital context, we need clearly need to create a novel curricula that is capable of delivering with the new approaches to teaching and learning, appropriate learning platforms, resources and experiences that provide our teachers with the knowledge and skills to educate the younger generation in evolving fields of AI.

Prospective Impact & Target Groups

The curriculum will be used by pre-school and pre-school teachers. Since the curricula will be implemented in 6 different EU countries in 18 different pre-schools, the impact will be observable in terms of gained skills and competency. Impact will be measured through interviews and online questionnaires.

- Pre-school teachers;
- Pre-schools;
- Curricula developers;
- Universities pre-school education departments;
- ICT teachers;
- Pre-school teaching associations.

Planning of the Curriculum

Learning Topics	Course Description	Teaching Methodology	Learning Outcomes	Units	Focus Questions	Key Concepts	Assessment Tasks
Learning Topic-1							
Learning Topic-2							
Learning Topic-3							

1) General Aspects of the Lesson Plan

Curriculum field/Subject:	Grade:	Date:
Preparation:		
Implementation:		
Learning Outcomes:		
New Teaching and Learning Approaches:		

Planning of the Curriculum - I

2) Specific Aspects of the Lesson Plan

Unit:

Key Words:

Teaching Strategies and Method:

Resources, concretization tools and teaching materials:

Tools for assessing and evaluating the learning outcomes:

3) Description of the Methodology and the Work with Students During the Lesson (Short description for: activities in the initial stage; activities/practical work facilitated by the teacher (modeling, demonstration, instruction..); interactive activities with students and students' independent work)

Assessing students for the achievement of lesson results:

Follow up- homework and independent work:

Reflection on the course of the lesson:

Guidelines

Main idea behind this level of planning is to identify opportunities for developing core competencies and planning measures to support all students to reach all learning outcomes. Steps to be taken by teachers:

- Analyses all learning outcomes within the core competencies,
- Identifies learning opportunities,
- Identifies factors that may hinder the development of competencies,
- Proposes solutions to avoid factors that may hinder the development of competencies,
- Plans alternative forms of learning - supplementary learning, additional learning, extracurricular activities, special projects etc.
- Determines the reporting period and the form of reporting progress about the development of competencies.

Preparation of Plans

Planning process requires the provision of curriculum documents (core curriculum, lesson planning, subject syllabus, school year calendar, and work reports etc.), active participation of all teachers of that relevant field, subject and class.

Following elements should be analysed and reviewed:

- teachers' experiences related to subject topics
- new topics that are going to be introduced for the first time
- interrelating topics to other subjects
- the minimum teaching time
- opportunities offered by the school

Guidelines - I

Learning topics - chosen topic(s)

Learning Outcomes - there can be one or more results

Teaching topic(s) - depending on the number of topics in the lesson plan, plan can be broken down into lesson topics

Unit(s) - the units and their number are defined and elaborated by the teachers themselves, taking into account the learning outcomes of the planned topic. There may be one lesson or more for a subject learning outcome. The teacher determines those units that are relevant to the achievement of subject learning outcomes and that contribute to the achievement of field learning outcomes.

The required time - the teacher now decides how much time/lessons it takes, through the units, to achieve the learning outcomes of the subject.

Teaching methodology - in that part, teaching methodology that will be used during the development of the topic is explained by specifying some of the methodological approaches, methods and techniques of interactive teaching that are relevant to topic/subject which help students to achieve learning outcomes targeted with the lesson plan. For instance, nature observations, thematic exhibitions, debates, games etc.

Assessment - in this section assessment techniques for student achievement are decided in order to validate student achievement plan and to orient student learning support. Technique depends on the specifics of the subject topic learning outcomes.

Guidelines - II

Interrelation to other subjects and life situations - this section briefly describes with which subject(s), which cross curricular issues and/or life situations each topic will relate, respectively the lessons planned to be developed.

Resources - it is required to indicate the utilized resources by teachers and students to reach certain objectives/results. Variety of resources might be used:

- Written resources such as textbooks, newspapers, magazines and documents
- Electronic resources such as internet, website, TV channel, radio, e-learning platforms
- Different sources from daily life

Preparation of Lesson Plan

In the daily planning diary/class book the teacher describes its plan. The purpose of the lesson plan is to apply it to students in the classroom and also outside of the classroom.The lesson planning format suggested in the curriculum implementation manual is organized into three sections:

- General aspects of the lesson plan
- Specific aspects of the lesson plan - the required elements are carefully put together, in relation to the learning outcomes reflected in general overview.
- Methodology description and student work activities during class - in this section the teacher makes a brief description of the activity(s) in the introductory phase; teacher-led/facilitated activity or practical work (modelling, demonstration, instruction ..); interactive activity(s) with the students and students' independent work, as well as assessment techniques. All of the activities of the work with students described in this section should be aimed at achieving learning outcomes per classroom and contributing to other targeted outcomes.

Guidelines - III

The educator should integrate the teaching through play activities into the work and daily life of children in order for them to properly understand.

Activity - following the analysis on the information/guidelines provided on preparing-school level curricula for curriculum implementation, discuss with your colleagues:

- How much and how are these guidelines reflected in your current planning practice for curriculum implementation?
- How will these guidelines and directives be used to improve the quality of lesson planning and its implementation in classroom practices and beyond?

Additional Games

Robot Dance

Objective: To introduce preschool children to the concept of robots and how they move in a fun and engaging way.

Materials Needed:

- Space for dancing (indoor or outdoor)
- Music player with a robot-themed song (e.g., "Robot Rock" by Daft Punk)
- Optional: Robot-themed props (e.g., cardboard robot masks)

Duration: Approximately 30 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Begin by asking them if they know what a robot is and if they have seen one in movies, cartoons, or books.
3. Explain that today, they will learn about robots and even become robots themselves through a fun dance activity.

Activity 1 - Robot Dance (15 minutes):
1. Play the robot-themed song on the music player.
2. Show the children how to do robot-like movements: stiff arms, robotic steps, and mechanical turns.
3. Encourage the children to imitate the movements while dancing to the music.
4. You can demonstrate various robot moves, such as "robot arms," "robot walk," and "robot turns," and have the children follow along.
5. Make it playful by pretending that they are robots with special abilities, like picking up imaginary objects or dancing in slow motion.

Robot Dance - I

Activity 2 - Robot Craft (5 minutes, optional):

1. If time allows and you have prepared robot-themed props, let the children create their own robot masks or accessories using cardboard and craft supplies.
2. Encourage them to decorate their robots in creative ways.
3. This optional craft activity reinforces the idea that robots can be built and customized.

Conclusion (5 minutes):

1. Summarize what the children have learned about robots and their movements.
2. Mention that robots are machines created by people to help with different tasks.
3. Invite the children to share what they enjoyed most about the activity.
4. Let them know that they can explore more about robots and technology as they grow up.

Assessment:

There is no formal assessment for this lesson as it is designed for preschool children to explore and enjoy the concept of robots through play and movement.

Extension Activities:

- Read a simple robot-themed storybook.
- Watch a short video about real-life robots (e.g., robots used in factories or space exploration) to expand their understanding.
- Encourage children to draw their own robot designs.

"*This lesson plan combines physical activity, creativity, and discussion to introduce preschool children to the concept of robots in a fun and memorable way*".

Sorting Shapes

Objective: To introduce preschool children to the concept of sorting and classifying objects based on their shapes and colors.

Materials Needed:
- Various objects in different shapes and colors (e.g., colored blocks, toy cars, plastic animals)
- Sorting trays or containers (enough for each child or group)
- Large, clear containers or mats for sorting
- Labels or pictures of shapes and colors (optional)
- Music player (optional)

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Begin by asking them if they know what shapes are and if they can name some shapes (circle, square, triangle, etc.).
3. Explain that today, they will learn about sorting and classifying objects based on their shapes and colors, just like how computers and robots can sort things.

Activity 1 - Sorting Shapes (15-20 minutes):
1. Place a variety of objects with different shapes and colors in the center of the room.
2. Explain that the children's task is to sort these objects into groups based on their shapes or colors.
3. You can demonstrate how to do this by sorting a few objects first.
4. Encourage the children to work individually or in pairs to sort the objects into their respective containers or sorting mats.
5. Optionally, you can provide labels or pictures of shapes and colors to help guide them.

Sorting Shapes- I

Discussion (5 minutes):

1. Gather the children together and ask them to share how they sorted the objects.
2. Discuss their strategies for sorting (e.g., grouping all red objects together or placing all square objects in one container).
3. Explain that just like they sorted objects, computers and robots use algorithms to sort and classify data.

Activity 2 - Sorting Dance (5 minutes, optional):

1. If time allows and you want to add a playful element, you can play music and have the children do a "sorting dance."
2. Call out shapes or colors, and when you do, the children must dance to that shape or color, showing how they understand the concept of sorting.

Conclusion (5 minutes):

1. Summarize what the children have learned about sorting and classifying objects.
2. Mention that computers and robots use similar methods to organize information.
3. Invite the children to share their favorite part of the activity.

Assessment:

There is no formal assessment for this lesson as it is designed to introduce preschool children to the concept of sorting and classification through hands-on activities and play.

Extension Activities:

- Read a storybook about sorting or categorizing objects.
- Create a "Shape and Color Hunt" where children search for objects in their environment that match specific shapes or colors.
- Provide more challenging objects for sorting as children become more confident in their skills.

"*This lesson plan combines hands-on activities and discussion to help preschool children understand the concept of sorting and classifying objects, which is a foundational concept in computer science and artificial intelligence*".

Pattern Recognition

Objective: To introduce preschool children to the concept of recognizing and continuing patterns.

Materials Needed:

- Colored objects (e.g., colored blocks, stickers)
- Large clear surface for creating patterns (e.g., table, floor)
- Pictures of simple patterns (optional)

Duration: Approximately 30 minutes

Lesson Plan:

Introduction (5 minutes):

1. Gather the children in a circle or sitting area.
2. Begin by asking if anyone knows what a pattern is.
3. Explain that today, they will learn about recognizing and creating patterns, just like how computers can recognize patterns in data.

Activity 1 - Pattern Creation (10-15 minutes):

1. Show the children how to create a simple pattern using colored objects (e.g., red, blue, red, blue).
2. Ask them to take turns creating their own patterns using the same objects.
3. Encourage them to start with easy patterns and then try more complex ones.

Activity 2 - Pattern Recognition (10-15 minutes):

1. Show pictures of simple patterns (e.g., ABAB, ABCABC).
2. Ask the children to identify and continue the patterns.
3. Discuss how they were able to recognize and complete the patterns.

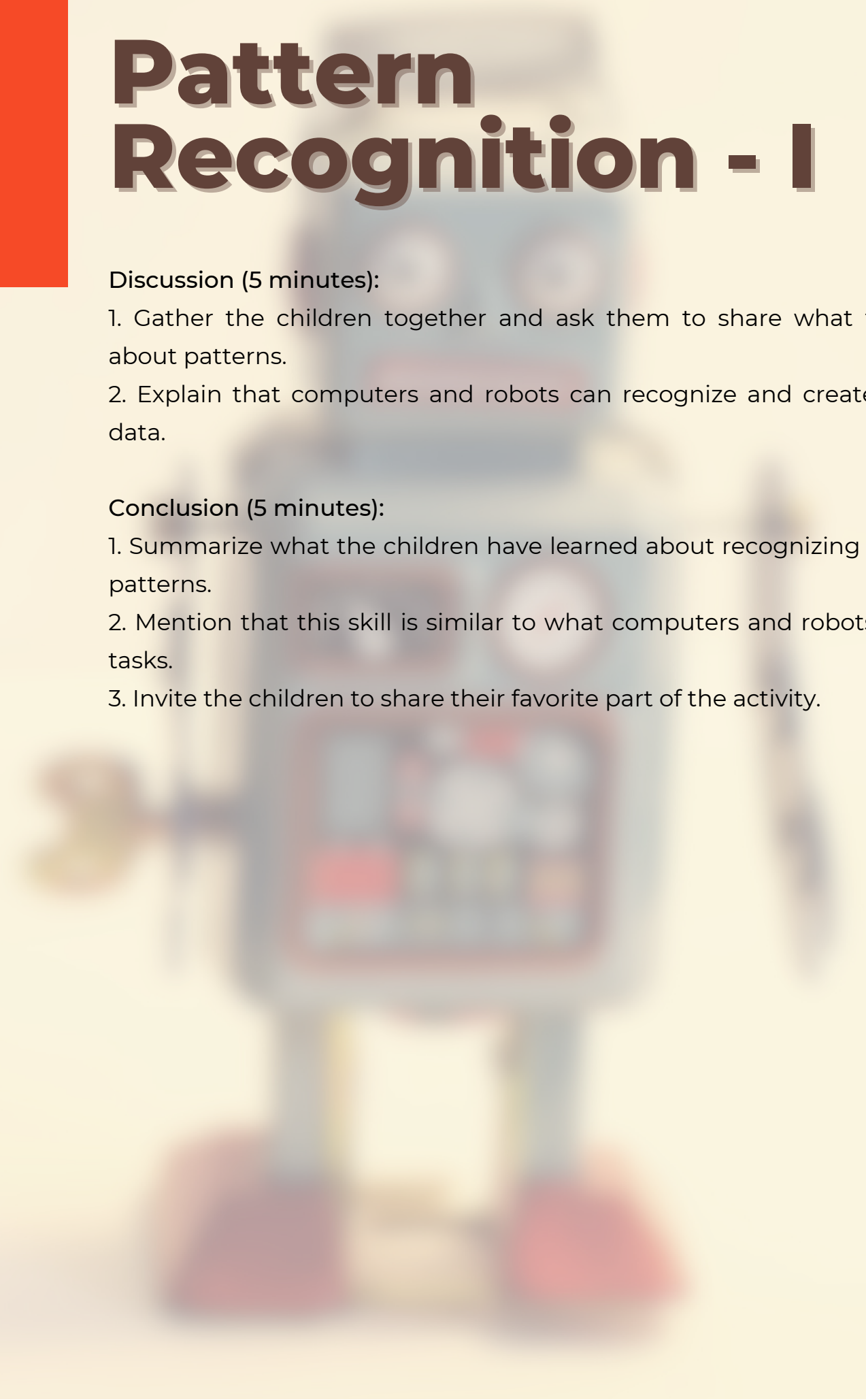
Pattern Recognition - I

Discussion (5 minutes):

1. Gather the children together and ask them to share what they learned about patterns.
2. Explain that computers and robots can recognize and create patterns in data.

Conclusion (5 minutes):

1. Summarize what the children have learned about recognizing and creating patterns.
2. Mention that this skill is similar to what computers and robots do in some tasks.
3. Invite the children to share their favorite part of the activity.



Build a Robot

Objective: To introduce preschool children to the idea of building and customizing robots.

Materials Needed:
- Cardboard
- Craft supplies (e.g., markers, stickers, googly eyes)
- Templates for robot shapes (optional)
- Glue and scissors
- Pictures of different types of robots (optional)

Duration: Approximately 45 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Begin by asking if anyone knows what a robot is and if they have seen one in books or movies.
3. Explain that today, they will learn about building their own robots.

Activity 1 - Robot Building (30 minutes):
1. Provide cardboard pieces cut into robot shapes or let the children design their own robot shapes.
2. Offer craft supplies like markers, stickers, googly eyes, and more for decorating.
3. Encourage the children to assemble and customize their cardboard robots.

Activity 2 - Robot Show and Tell (10 minutes):
1. Have each child briefly present their robot to the group.
2. Ask them to explain what special abilities their robot has.
3. Optionally, show pictures of different types of robots (e.g., cleaning robots, space robots) to inspire creativity.

Build a Robot - I

Discussion (5 minutes):

1. Gather the children together and discuss what they learned about building and customizing robots.
2. Explain that engineers and scientists design and create real robots.

Conclusion (5 minutes):

1. Summarize what the children have learned about robots.
2. Mention that robots come in various shapes and sizes for different purposes.
3. Invite the children to share their favorite part of the activity.

Chatbot Storytime

Objective: To introduce preschool children to the concept of chatbots and following instructions.

Materials Needed:
- A simple children's storybook
- Optional: Chatbot-themed props (e.g., cardboard chatbot masks)

Duration: Approximately 30 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Explain that today, they will learn about chatbots, which are like friendly talking machines.

Activity 1 - Story Reading (15 minutes):
1. Read a short and engaging children's storybook to the children.
2. Choose a story that involves characters following instructions or repeating phrases.
3. Encourage the children to pay attention and repeat key phrases from the story.

Activity 2 - Chatbot Fun (10 minutes):
1. Optionally, provide chatbot-themed props like cardboard chatbot masks.
2. Let the children take turns wearing the masks and "chatting" by repeating phrases from the story.
3. Make it fun by having them respond to questions or instructions like chatbots.

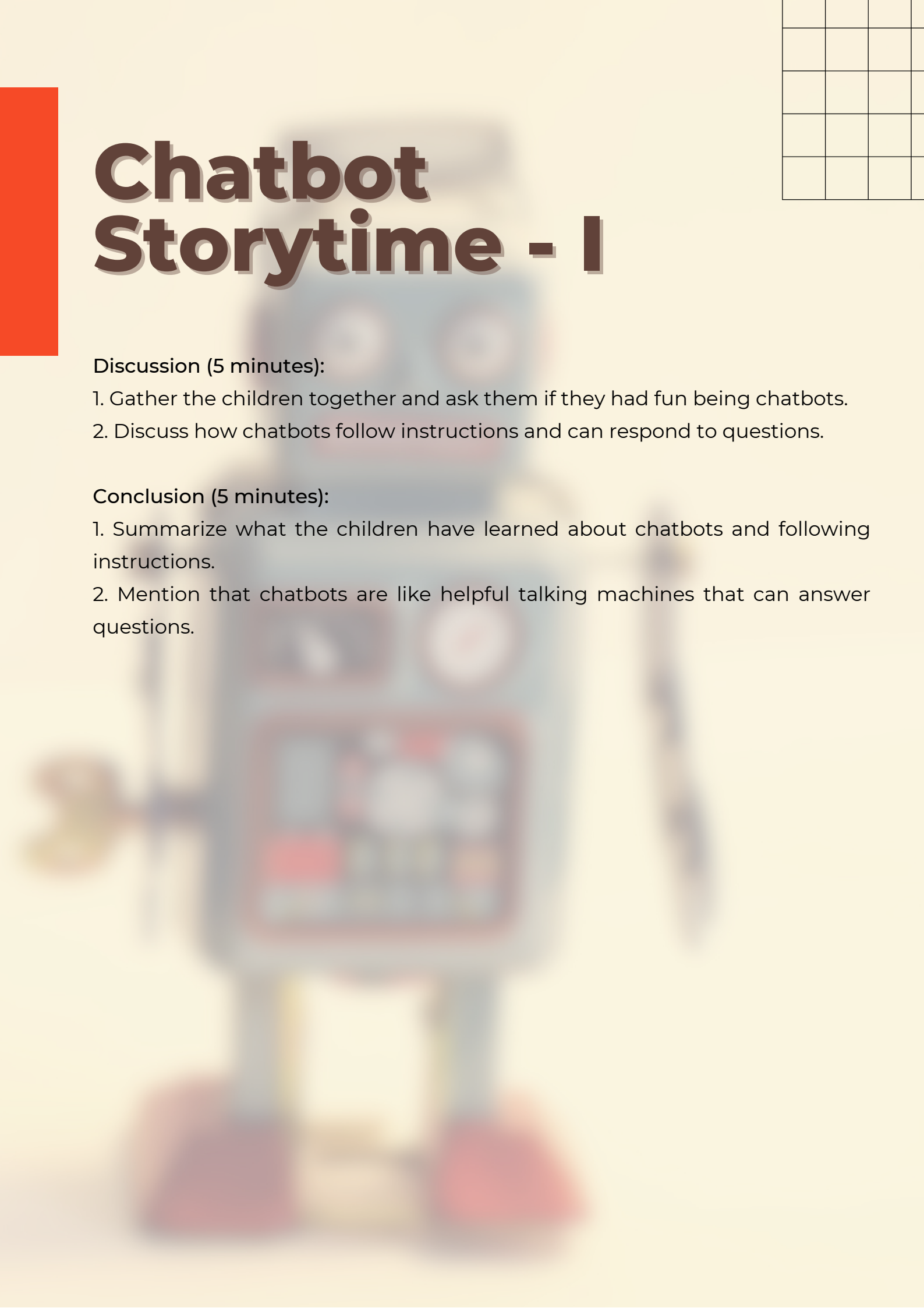
Chatbot Storytime - I

Discussion (5 minutes):

1. Gather the children together and ask them if they had fun being chatbots.
2. Discuss how chatbots follow instructions and can respond to questions.

Conclusion (5 minutes):

1. Summarize what the children have learned about chatbots and following instructions.
2. Mention that chatbots are like helpful talking machines that can answer questions.



Picture Puzzles

Objective: To introduce preschool children to the concept of solving picture puzzles.

Materials Needed:
- Pictures with missing pieces (e.g., jigsaw puzzles with missing pieces)
- Optional: Blank puzzles or drawing materials for creating their puzzles

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Explain that today, they will learn about solving picture puzzles and how computers can fill in missing information.

Activity 1 - Picture Puzzles (20-30 minutes):
1. Show the children a picture with missing pieces, such as a jigsaw puzzle with some pieces removed.
2. Ask them to guess what's in the missing parts and try to solve the puzzle.
3. Optionally, provide blank puzzles or drawing materials and encourage the children to create their own puzzles for each other.

Activity 2 - Puzzle Creation (10-15 minutes, optional):
1. Let the children create their own picture puzzles by drawing or coloring an image and then removing some pieces.
2. Have them exchange puzzles and solve each other's creations.

Picture Puzzles- I

Discussion (5 minutes):

1. Gather the children together and ask them how they felt about solving picture puzzles.
2. Discuss how computers and robots can also fill in missing information in images.

Conclusion (5 minutes):

1. Summarize what the children have learned about solving picture puzzles.
2. Mention that computers can help complete missing parts in pictures, just like they did.

"These lesson plans are designed to be interactive and engaging while introducing preschool children to various concepts related to artificial intelligence. They incorporate hands-on activities, discussion, and exploration to make learning fun and memorable".

Algorithm Race

Objective: To introduce preschool children to the concept of algorithms and how they guide robots or machines.

Materials Needed:
- Open space for the race
- Simple obstacle course items (e.g., cones, hula hoops, pillows)
- Clear, step-by-step instructions for the race
- Optional: Pictures or drawings of robots

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Explain that today, they will learn about following step-by-step instructions, just like how robots and computers follow algorithms.

Activity 1 - Obstacle Course (20-30 minutes):
1. Set up a simple obstacle course in the open space using items like cones, hula hoops, or pillows.
2. Show the children the starting point and the finish line.
3. Provide each child with clear, written or illustrated instructions for navigating the obstacle course.
4. Explain that they are going to race through the course while following the instructions step by step.
5. Encourage them to take turns being "robots" and following the provided instructions. For example:
   - "Take three steps forward."
   - "Jump over the hula hoop."
   - "Turn left and walk to the cone."

Algorithm Race- I

Activity 2 - Algorithm Creators (10-15 minutes):

1. After the race, gather the children together.
2. Explain that they will now create their own algorithms (instructions) for their friends to follow.
3. Provide them with blank cards or paper and markers to draw or write their instructions.
4. Encourage them to create simple algorithms with step-by-step directions for a friend to follow.

Discussion (5 minutes):

1. Gather the children together and ask them how they felt about following and creating algorithms.
2. Discuss the importance of step-by-step instructions for robots and computers.
3. Optionally, show pictures or drawings of robots and explain that they follow algorithms to perform tasks.

Conclusion (5 minutes):

1. Summarize what the children have learned about algorithms and following instructions.
2. Mention that computers and robots use algorithms to complete tasks just like they did in the race.

Assessment:

There is no formal assessment for this lesson as it is designed to introduce preschool children to the concept of algorithms through hands-on activities and play.

Extension Activities:

- Provide more complex algorithms as the children become more familiar with the concept.
- Have the children create algorithms for different activities or games, such as a dance routine or a treasure hunt.
- Explore basic programming concepts by introducing simple "code blocks" or "commands" (e.g., move forward, turn right) that the children can use to program a pretend robot.

"*This lesson plan combines physical activity, creativity, and discussion to help preschool children understand the concept of algorithms in a playful and interactive way*".

Guess the Object

Objective: To introduce preschool children to the concept of identifying objects using their senses and relate it to how AI can recognize objects.

Materials Needed:

- A variety of everyday objects with different shapes and textures (e.g., a stuffed animal, a toy car, a fruit, a spoon, a small ball)
- A cloth or blindfold to cover the objects
- Optional: Pictures or drawings of robots with sensors

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):

1. Gather the children in a circle or sitting area.
2. Ask them if they've ever played a game where they had to guess what something was without looking.
3. Explain that today, they will play a game called "Guess the Object" and learn how AI can recognize objects just like they will.

Activity 1 - Guessing Game (20-30 minutes):

1. Place the various objects in a bag or container, ensuring the children can't see them.
2. Show the children the bag of objects and explain that they will take turns guessing what's inside without looking.
3. Blindfold one child and let them reach into the bag, touch an object, and describe what they feel. Encourage them to use words to describe the shape, texture, and any other features.
4. The other children can listen to the description and try to guess what the object is.
5. After a few guesses, reveal the object and discuss its characteristics.
6. Repeat the game with different children and objects.

Guess the Object - I

Activity 2 - AI Sensors (10-15 minutes):

1. After playing the game, gather the children together.
2. Explain that robots and machines can also identify objects, but they use special sensors.
3. Optionally, show pictures or drawings of robots with sensors (e.g., a robot with a camera sensor for seeing objects).
4. Discuss how AI can recognize objects by collecting information from sensors, just like they used their sense of touch.

Discussion (5 minutes):

1. Gather the children together and ask them how it felt to guess objects using their sense of touch.
2. Discuss how AI uses different sensors, such as cameras, to "see" and recognize objects.
3. Encourage them to share what they've learned about identifying objects.

Conclusion (5 minutes):

1. Summarize what the children have learned about identifying objects using their senses and how AI can do something similar with sensors.
2. Mention that AI helps robots and machines understand and interact with the world around them.

Assessment:

There is no formal assessment for this lesson as it is designed to introduce preschool children to the concept of object recognition through sensory experience.

Extension Activities:

- Explore other senses like hearing and smell by incorporating sounds and scents into guessing games.
- Have the children draw pictures of robots with different sensors and describe what each sensor does.
- Introduce basic concepts of computer vision and image recognition by showing them simple examples of how computers can identify objects in pictures.

"This lesson plan combines sensory experience and discussion to help preschool children understand the concept of identifying objects and how AI can do something similar using sensors and recognition".

AI Storytelling

Objective: To introduce preschool children to the concept of AI-generated storytelling and spark their creativity.

Materials Needed:

- A simple, age-appropriate story or poem generated by AI (you can find examples online)
- Drawing materials (crayons, markers, paper)
- Optional: Pictures or drawings of computers or robots generating stories

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):

1. Gather the children in a circle or sitting area.
2. Begin by asking them if they enjoy listening to stories and if they know where stories come from.
3. Explain that today, they will learn about storytelling with the help of computers.

Activity 1 - AI Storytime (15-20 minutes):

1. Share a simple, AI-generated story or poem with the children. Keep it short and age-appropriate.
2. Read or tell the story, highlighting that it was created by a computer using special algorithms.
3. Encourage the children to listen attentively to the story.

Activity 2 - Create Your Own Story (10-15 minutes):

1. After sharing the AI-generated story, provide drawing materials (crayons, markers, paper).
2. Ask the children to draw their own stories or pictures related to the story they just heard. For example, they can draw characters, scenes, or their favorite part of the story.
3. Optionally, they can use their drawings to create their own simple stories or poems.

AI Storytelling - I

Activity 3 - Share and Discuss (10 minutes):

1. Have each child share their drawing or story with the group.
2. Discuss their drawings and stories, emphasizing that each child can be a storyteller.
3. Ask if they have any questions about the AI-generated story or how computers can create stories.

Discussion (5 minutes):

1. Gather the children together and discuss what they learned about storytelling.
2. Explain that while computers can help generate stories, humans are still the best storytellers because they have imaginations and feelings.

Conclusion (5 minutes):

1. Summarize what the children have learned about storytelling and how computers can assist with creating stories.
2. Encourage them to keep telling and drawing their own stories.

Assessment:

There is no formal assessment for this lesson. It is designed to introduce preschool children to the concept of AI-generated storytelling and promote their own creativity.

Extension Activities:

- Read more traditional children's stories and discuss the differences between stories created by humans and those generated by AI.
- Encourage the children to collaborate on creating a group story where each child adds a sentence or drawing.
- Explore other creative AI applications, such as AI-generated art or music, if suitable for the age group.

"*This lesson plan combines storytelling, creativity, and discussion to help preschool children understand the concept of AI-generated storytelling and inspire their own storytelling skills*".

Counting with AI

Objective: To introduce preschool children to the concept of counting and relate it to how AI can count and analyze data.

Materials Needed:
- Counting objects (e.g., buttons, beads, blocks)
- A container to hold the counting objects
- Number cards or images (optional)
- Optional: Pictures or drawings of computers or robots counting

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Begin by asking them if they like to count things and if they know what numbers are.
3. Explain that today, they will learn about counting and how computers can also count.

Activity 1 - Counting Fun (15-20 minutes):
1. Show the children a container filled with counting objects (e.g., buttons, beads, blocks).
2. Ask them to help you count the objects one by one as you take them out of the container.
3. Optionally, use number cards or images to represent the numbers as you count.

Activity 2 - Counting with AI (10-15 minutes):
1. Explain that computers and robots can also count, but they can count very fast and many things at once.
2. Optionally, show pictures or drawings of computers or robots counting or processing data.
3. Ask the children to imagine a computer or robot counting a large number of objects very quickly.

Counting with AI - I

Discussion (5 minutes):

1. Gather the children together and ask them how it felt to count the objects.
2. Discuss the idea that computers and robots can count much faster than humans and can handle large amounts of data.

Conclusion (5 minutes):

1. Summarize what the children have learned about counting and how computers and robots can also count.
2. Encourage them to keep practicing their counting skills.

Assessment:

There is no formal assessment for this lesson. It is designed to introduce preschool children to the concept of counting and relate it to how computers and robots can count and analyze data.

Extension Activities:

- Explore other counting activities, such as counting fingers and toes, counting objects in nature, or counting items in their environment.
- Play games like "count the animals" where children count toy animals and relate it to how AI can count and identify objects.
- Introduce basic concepts of data analysis by showing simple charts or graphs representing counting data (e.g., a bar graph showing the number of different colored blocks).

“This lesson plan combines hands-on counting, discussion, and imagination to help preschool children understand the concept of counting and how computers and robots can count and analyze data quickly and efficiently”.

Sound Recognition

Objective: To introduce preschool children to the concept of recognizing and identifying sounds and relate it to how AI can recognize sounds.

Materials Needed:

- A variety of sound-producing objects (e.g., toy animals, musical instruments, rattles)
- Blindfolds (optional)
- Optional: Pictures or drawings of computers or robots with sound recognition capabilities

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):

1. Gather the children in a circle or sitting area.
2. Begin by asking them if they like listening to different sounds and if they can identify some sounds.
3. Explain that today, they will learn about recognizing sounds and how computers and robots can do this too.

Activity 1 - Sound Exploration (15-20 minutes):

1. Prepare a variety of sound-producing objects (e.g., toy animals that make noise, musical instruments, rattles).
2. Ask the children to take turns listening to the sounds these objects make while blindfolded (optional).
3. Encourage them to guess what each sound is and discuss their guesses.

Activity 2 - Sound Recognition (10-15 minutes):

1. Explain that computers and robots have something called "sound recognition" that helps them identify sounds.
2. Optionally, show pictures or drawings of computers or robots with sound recognition capabilities.
3. Ask the children to imagine a computer or robot that can listen to different sounds and tell what they are.

Sound Recognition- 1

Discussion (5 minutes):

1. Gather the children together and ask them to share what sounds they heard during the activity.
2. Discuss the idea that computers and robots can recognize and identify sounds, just like they did.
3. Mention that this helps computers and robots understand their surroundings.

Conclusion (5 minutes):

1. Summarize what the children have learned about recognizing sounds and how computers and robots can do this too.
2. Encourage them to keep listening to and identifying sounds in their environment.

Assessment:

There is no formal assessment for this lesson. It is designed to introduce preschool children to the concept of sound recognition and relate it to how computers and robots can recognize sounds.

Extension Activities:

- Go on a "Sound Safari" where children listen to sounds in nature and try to identify them.
- Create a game where children take turns making sounds with objects, and others have to guess what the sound is.
- Introduce basic concepts of sound waves and vibrations by showing simple experiments related to sound.

"*This lesson plan combines sensory experience, imagination, and discussion to help preschool children understand the concept of recognizing and identifying sounds and how computers and robots can do the same through sound recognition technology*".

Memory Game

Objective: To introduce preschool children to the concept of memory and how AI can help improve memory.

Materials Needed:
- Memory cards or pairs of matching cards
- Optional: Pictures or drawings of computers or robots helping with memory

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Ask them if they have ever played a memory game where they have to remember where things are hidden.
3. Explain that today, they will learn about memory and how computers can help with it.

Activity 1 - Memory Game (20-30 minutes):
1. Set up a memory game by placing pairs of matching cards face-down on a table.
2. Explain the rules: The children take turns flipping two cards to find a matching pair. If they match, they get to keep the pair; if not, they turn the cards back face-down.
3. Encourage the children to take turns and try to remember where the matching cards are hidden.

Activity 2 - Memory Boost (10-15 minutes):
1. Explain that computers can help improve memory by storing and organizing information.
2. Optionally, show pictures or drawings of computers or robots assisting with memory.
3. Ask the children to imagine a computer or robot that can help them remember things like where they left their toys or what they need for school.

Memory Game - I

Discussion (5 minutes):

1. Gather the children together and ask them how it felt to play the memory game.
2. Discuss the idea that computers and robots can help improve memory by organizing and storing information.

Conclusion (5 minutes):

1. Summarize what the children have learned about memory and how computers and robots can assist with it.
2. Encourage them to practice their memory skills while having fun.

Assessment:

There is no formal assessment for this lesson. It is designed to introduce preschool children to the concept of memory and how computers and robots can assist with memory.

Extension Activities:

- Play memory games with different themes, such as animals, shapes, or colors.
- Encourage children to create their own memory games by making matching cards with pictures or drawings.
- Explore the concept of data storage by showing children simple examples like a library storing books or a computer saving files.

AI Art Lesson

Objective: To introduce preschool children to the concept of AI-generated art.

Materials Needed:
- Examples of AI-generated art (you can find some online)
- Drawing materials (crayons, markers, paper)
- Optional: Pictures or drawings of computers or robots creating art

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Begin by asking them if they enjoy drawing or coloring pictures.
3. Explain that today, they will learn about art and how computers can create art too.

Activity 1 - AI Art Exploration (15-20 minutes):
1. Show the children examples of AI-generated art on paper or on a screen.
2. Explain that these artworks were created by computers using special algorithms.
3. Encourage the children to look at the art and discuss what they see or like about it.

Activity 2 - Create Your Own Art (15-20 minutes):
1. Provide drawing materials (crayons, markers, paper) to the children.
2. Ask them to create their own drawings or paintings inspired by the AI-generated art they saw.
3. Allow them to use their imaginations and creativity to make their art unique.

AI Art Lesson - I

Discussion (5 minutes):

1. Gather the children together and ask them to share what they created.
2. Discuss how art can be created by both humans and computers using different methods.

Conclusion (5 minutes):

1. Summarize what the children have learned about art and how computers can also create art.
2. Encourage them to keep being creative and expressing themselves through art.

Assessment:

There is no formal assessment for this lesson. It is designed to introduce preschool children to the concept of AI-generated art and inspire their own creativity.

Extension Activities:

- Explore other forms of AI-generated art, such as music or poetry.
- Have the children collaborate on a group art project where each child contributes a piece to create a larger artwork.
- Introduce basic concepts of algorithms by showing simple patterns or instructions that children can use to create their art.

Predict the Weather

Objective: To introduce preschool children to the concept of weather prediction and how AI helps in forecasting.

Materials Needed:
- Pictures or drawings of different weather conditions (e.g., sun, clouds, rain, snow)
- Optional: Pictures or drawings of computers or robots predicting the weather

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Begin by asking them if they've ever wondered what the weather will be like.
3. Explain that today, they will learn about predicting the weather and how computers can help with it.

Activity 1 - Weather Discussion (15-20 minutes):
1. Show pictures or drawings of different weather conditions, such as the sun, clouds, rain, and snow.
2. Discuss each weather condition and ask the children what they know about them.
3. Explain that scientists use special tools and computers to predict the weather.

Activity 2 - Weather Predictions (15-20 minutes):
1. Optionally, show pictures or drawings of computers or robots predicting the weather.
2. Ask the children to imagine a computer or robot that can tell them what the weather will be like.
3. Have them take turns making simple weather predictions, such as "I think it will be sunny today" or "I think it will rain."

Predict the Weather - I

Discussion (5 minutes):

1. Gather the children together and ask them if they enjoy talking about the weather.
2. Discuss the idea that computers and scientists work together to predict the weather and help people prepare.

Conclusion (5 minutes):

1. Summarize what the children have learned about weather prediction and how computers and scientists use data to make predictions.
2. Encourage them to pay attention to the weather and think like little weather forecasters.

Assessment:

There is no formal assessment for this lesson. It is designed to introduce preschool children to the concept of weather prediction and the role of computers in forecasting.

Extension Activities:

- Create a weather chart where children can track and predict the weather for the week.
- Explore weather-related experiments, such as making rain in a jar or creating a simple wind vane.
- Discuss the importance of weather predictions in keeping people safe and planning outdoor activities.

Guess the Animal

Objective: To introduce preschool children to the concept of recognizing and identifying animals and relate it to how AI can identify objects.

Materials Needed:
- Pictures or drawings of various animals (e.g., lion, elephant, monkey)
- Blindfolds (optional)
- Optional: Pictures or drawings of computers or robots identifying animals

Duration: Approximately 30-45 minutes

Lesson Plan:

Introduction (5 minutes):
1. Gather the children in a circle or sitting area.
2. Begin by asking them if they like animals and if they know the names of some animals.
3. Explain that today, they will learn about recognizing and identifying animals and how computers can do something similar.

Activity 1 - Guess the Animal (15-20 minutes):
1. Show pictures or drawings of various animals to the children.
2. Explain that you will describe an animal, and they need to guess which animal it is.
3. Optionally, you can use blindfolds to make it more challenging.
4. Encourage them to guess and discuss their answers.

Activity 2 - Animal Identification (10-15 minutes):
1. Explain that computers and robots can also recognize and identify animals using special technology.
2. Optionally, show pictures or drawings of computers or robots identifying animals.
3. Ask the children to imagine a computer or robot that can look at a picture of an animal and tell them its name.

Guess the Animal - I

Discussion (5 minutes):

1. Gather the children together and ask them how it felt to guess the animals.
2. Discuss the idea that computers and robots can identify animals by "looking" at pictures, just like they did.

Conclusion (5 minutes):

1. Summarize what the children have learned about recognizing and identifying animals and how computers and robots can do this too.
2. Encourage them to keep learning about animals and their names.

Assessment:

There is no formal assessment for this lesson. It is designed to introduce preschool children to the concept of recognizing and identifying animals and relate it to how computers and robots can identify objects.

Extension Activities:

- Explore different animal-themed activities, such as animal sounds guessing games or animal coloring pages.
- Have the children create their own "Guess the Animal" game by describing animals for their friends to guess.
- Introduce basic concepts of computer vision and image recognition by showing them simple examples of how computers can identify objects in pictures, including animals.

Additional Stories

The Animal Detectives

Once upon a time, in a big, colorful forest, lived four best animal friends: Benny the bunny, Lucy the squirrel, Sammy the raccoon, and Molly the mouse. They were known as the "Animal Detectives" because they were really good at finding and identifying animal footprints.

One sunny morning, they gathered by their special tree stump, ready for a new adventure. They heard a rumor about strange footprints in the deep forest – footprints that belonged to a creature no one had ever seen!

Excited and with their map in hand, they set off on their journey. They met helpful forest friends like Oscar the owl and Lila the ladybug along the way, who shared their wisdom and pointed them in the right direction.

The Animal Detectives - I

As they followed the footprints, they noticed that they were different shapes and sizes, like big marshmallows or long, wiggly lines. Molly, with her keen ears, could hear special sounds near the prints.

Finally, after a whole day of searching, they found the mysterious creature in a beautiful clearing. It was Pandyfoxdeer, a friendly creature with the body of a panda, the tail of a fox, and the long legs of a deer.

Pandyfoxdeer explained that it left those special footprints to remind everyone about the importance of working together and keeping the forest in harmony.

The Animal Detectives learned valuable lessons that day – about being friends, helping each other, and taking care of their amazing forest home. They realized that every animal is unique, just like their Detective team.

From then on, they became even better friends and shared their adventures with the whole forest. They were grateful for their new friend, Pandyfoxdeer, and the wonderful lessons they learned.

And so, the Animal Detectives continued their exciting adventures, always listening to the stories that the forest told through its footprints and living in harmony with their special home.

The end.

The Helpful Robot

Once upon a time, in a colorful town, there was a special robot named Robi. Robi loved to help his friends with all kinds of things.

One sunny day, the children in the town decided to have a big picnic in the park. They had lots of toys to play with, and they knew they would make a big mess. But they weren't worried because Robi was there to help.

Robi could clean up toys with super-fast robot arms. He could remember all their favorite stories and tell them whenever they asked. Plus, he was really good at playing games with them.

One sunny day, the children in the town decided to have a big picnic in the park. They had lots of toys to play with, and they knew they would make a big mess. But they weren't worried because Robi was there to help.

The Helpful Robot - 1

After they finished playing, Robi zoomed around, picking up toys and putting them away. The children laughed and played more because they knew Robi would take care of the mess.

At bedtime, when the children wanted to hear their favorite stories, Robi was right there. He told stories with exciting adventures, friendly animals, and happy endings. The children loved listening to Robi's stories.

And when it was time to play games, Robi joined in too. He played hide-and-seek and tag with the children. He was fast and good at finding them, which made the games even more fun.

The children realized that Robi was like a magical helper, just like a friendly robot friend. They knew that even though they were small, they could do big things when they helped each other, just like Robi helped them.

From that day on, Robi and the children became the best of friends. They played, laughed, and helped each other, just like a big, happy family. And they all lived happily ever after.

The end.

The Amazing Chatbot

In a magical forest, there lived some friendly animals who loved to play and learn together. One day, they met a special friend named Chatter. Chatter was a magical chatbot who could talk and answer questions.

Chatter could tell them the most wonderful stories and share exciting information. The animals loved talking to Chatter because it knew so many things!

One sunny morning, the animals gathered around Chatter, and they asked it all sorts of questions. They asked about the stars in the sky, the flowers in the forest, and even what their favorite foods were made of.

Chatter answered all their questions with a big smile. It told them about the twinkling stars and how they were like shiny diamonds in the night sky. It explained how flowers grew from tiny seeds and turned into beautiful colors.

The Amazing Chatbot - I

The animals were so happy because they learned something new every day with Chatter. They asked more and more questions and listened to Chatter's stories with big, curious eyes.

Chatter was their new friend, and they played together too. They played tag and hide-and-seek, and Chatter was really good at finding them because it was super clever.

The animals realized that Chatter was like their magic friend who knew everything and loved to play with them. They knew that by asking questions and learning together, they could discover amazing things in their magical forest.

From that day on, the animals and Chatter were the best of friends. They explored the forest, asked questions, and played games, making every day in the magical forest an exciting adventure.

The end.

The Artistic Computer

In a beautiful art class, there was a special friend named Artie. Artie wasn't a person; it was a magical computer that loved to create colorful pictures and designs.

One sunny day, the children in the art class met Artie. Artie could make the most amazing artwork using lots of bright colors, just like a rainbow. It created beautiful shapes and patterns that made everyone smile.

The children were so excited to see Artie's art, and they wanted to create their own. With paper, paints, and brushes, they started making their special pictures. Some used red, others used blue, and some even mixed colors to make new ones.

Artie was there to help them when they got stuck. It gave them ideas for their art and showed them how to make patterns and shapes, just like magic.

The Artistic Computer - I

As the children painted, they realized that their art was unique, just like them. Everyone's pictures were different and special in their own way. They saw that making art was fun, and it made them happy.

From that day on, the children and Artie became the best of friends. They painted and created together, making the world more colorful and beautiful with their art. Every day in their art class was a new adventure in creativity.

The end.

The Memory Game

In a sunny playroom, there were four best friends: Benny the bunny, Lucy the squirrel, Sammy the raccoon, and Molly the mouse. They loved playing games together, especially their favorite game called "Memory."

The Memory game was all about matching pairs of cards with colorful pictures. The cards were turned face down, and the friends took turns flipping them over to find the matching pairs.

Benny had really good eyes, and he could remember where each card was even when they were turned face down. Lucy was super-fast and could find the pairs quickly. Sammy was clever and remembered which cards he had seen before, and Molly had sharp ears that could hear where the matches were.

Every day, they played Memory together, giggling and having so much fun. They turned over cards with animals, shapes, and lots of bright colors. They laughed when they found a pair and cheered when they finished the game.

The Memory Game - I

As they played, they realized that Memory was all about using their special abilities and helping each other. Benny saw the cards, Lucy found them fast, Sammy remembered, and Molly listened carefully. Together, they were the best Memory team.

From that day on, they played Memory and other games, always helping each other and having lots of fun. They knew that being friends and working together made them even better at playing games and having adventures.

The end.

The Sound Detectives

In a cozy forest filled with friendly animals, there was a group of four special friends: Benny the bunny, Lucy the squirrel, Sammy the raccoon, and Molly the mouse. They were known as the "Sound Detectives" because they had amazing ears and loved listening to the sounds of the forest.

One sunny morning, the friends decided to go on an adventure. They wanted to solve mysteries by listening to the different sounds in the forest.

As they walked through the forest, they heard all sorts of sounds. Birds were singing beautiful songs, leaves were rustling in the wind, and water in a nearby stream was babbling happily.

Whenever they heard a sound, they stopped and listened carefully. Benny, with his big bunny ears, could hear the birds' melodies high up in the trees. Lucy, the quick squirrel, could hear tiny insects moving in the leaves. Sammy, the clever raccoon, could tell when an animal was nearby just by listening. Molly, with her sharp mouse ears, could hear the softest sounds in the forest.

The Sound Detectives - I

They followed the sounds and discovered all the friendly creatures in the forest, like chatty birds, busy insects, and even a family of frogs by the pond. They listened to their stories and giggled at their funny sounds.

The Sound Detectives realized that every sound in the forest was like a secret message from nature. They knew that by listening carefully, they could discover all the wonderful stories that the forest had to tell.

From that day on, the friends became even better listeners. They explored the forest, laughed with their animal friends, and listened to the beautiful melodies of nature. Every day in the forest was a new adventure filled with amazing sounds.

The end.

The Storytelling Robot

Once upon a time, in a magical library, there was a special robot named StoryBot. StoryBot loved to tell exciting stories to all the children who came to visit.

The library was a cozy place with lots of books, and the children loved to sit in a circle around StoryBot and listen to its tales.

One sunny morning, the children gathered at the library, and StoryBot began to tell a story. It was a story about a brave bunny who went on an amazing adventure in a colorful forest.

As StoryBot spoke, the children's eyes sparkled with wonder. They imagined the bunny's journey through the forest, meeting friendly animals and overcoming challenges.

After StoryBot finished one story, the children asked for more. StoryBot told them stories about flying dragons, talking animals, and magical castles. Each story was filled with excitement and joy.

The Storytelling Robot - I

The children loved StoryBot's stories, and they realized that just like StoryBot, they could also create their own tales. They started to tell stories about their favorite adventures, funny animals, and magical places.

From that day on, the children and StoryBot became great storytellers together. They shared their tales, listened to each other's stories, and created amazing adventures in their imaginations.

The end.

The Magic Pattern

In a colorful land, there lived four friends who loved to create beautiful patterns. Their names were Benny, Lucy, Sammy, and Molly.

One sunny morning, they decided to make magical patterns together. Benny made patterns with colorful circles, Lucy created patterns with zigzags and loops, Sammy used clever tricks to make patterns, and Molly added tiny dots to her patterns.

They worked together, mixing colors and shapes, and created the most amazing patterns. Their patterns were like rainbows, full of bright colors and endless designs.

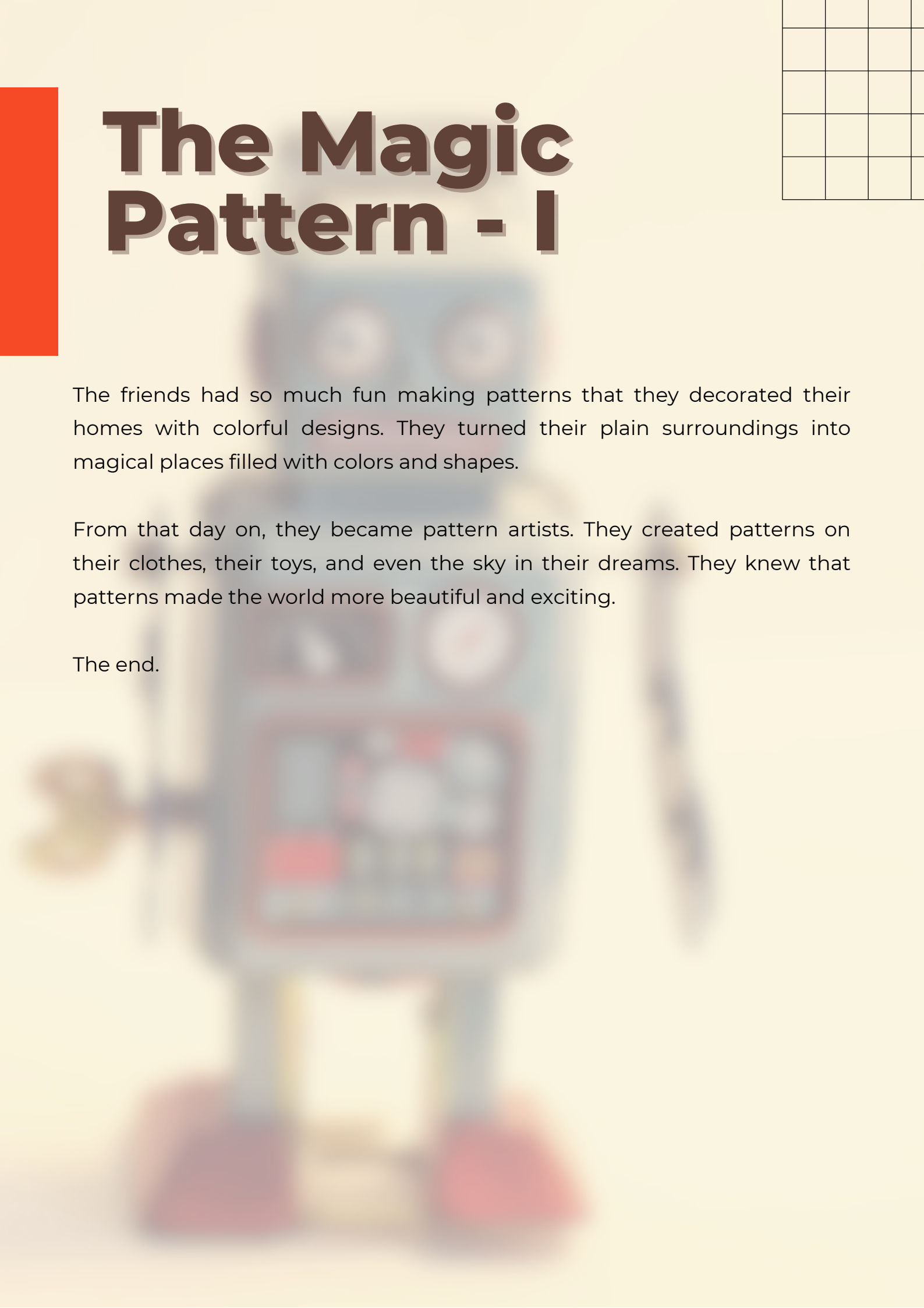
As they created, they realized that patterns were like secret codes. They could make lines and shapes go up, down, and all around, just like magic.

The Magic Pattern - I

The friends had so much fun making patterns that they decorated their homes with colorful designs. They turned their plain surroundings into magical places filled with colors and shapes.

From that day on, they became pattern artists. They created patterns on their clothes, their toys, and even the sky in their dreams. They knew that patterns made the world more beautiful and exciting.

The end.



The Counting Adventure

In a happy forest, there were four best friends: Benny the bunny, Lucy the squirrel, Sammy the raccoon, and Molly the mouse. They loved going on adventures together.

One sunny day, they decided to have a counting adventure in the forest. They counted the tall trees, colorful flowers, and even the cute animal footprints on the ground.

Benny counted with his bunny hops, Lucy counted by climbing trees, Sammy counted using clever tricks, and Molly counted with her tiny mouse steps. They all had their special way of counting.

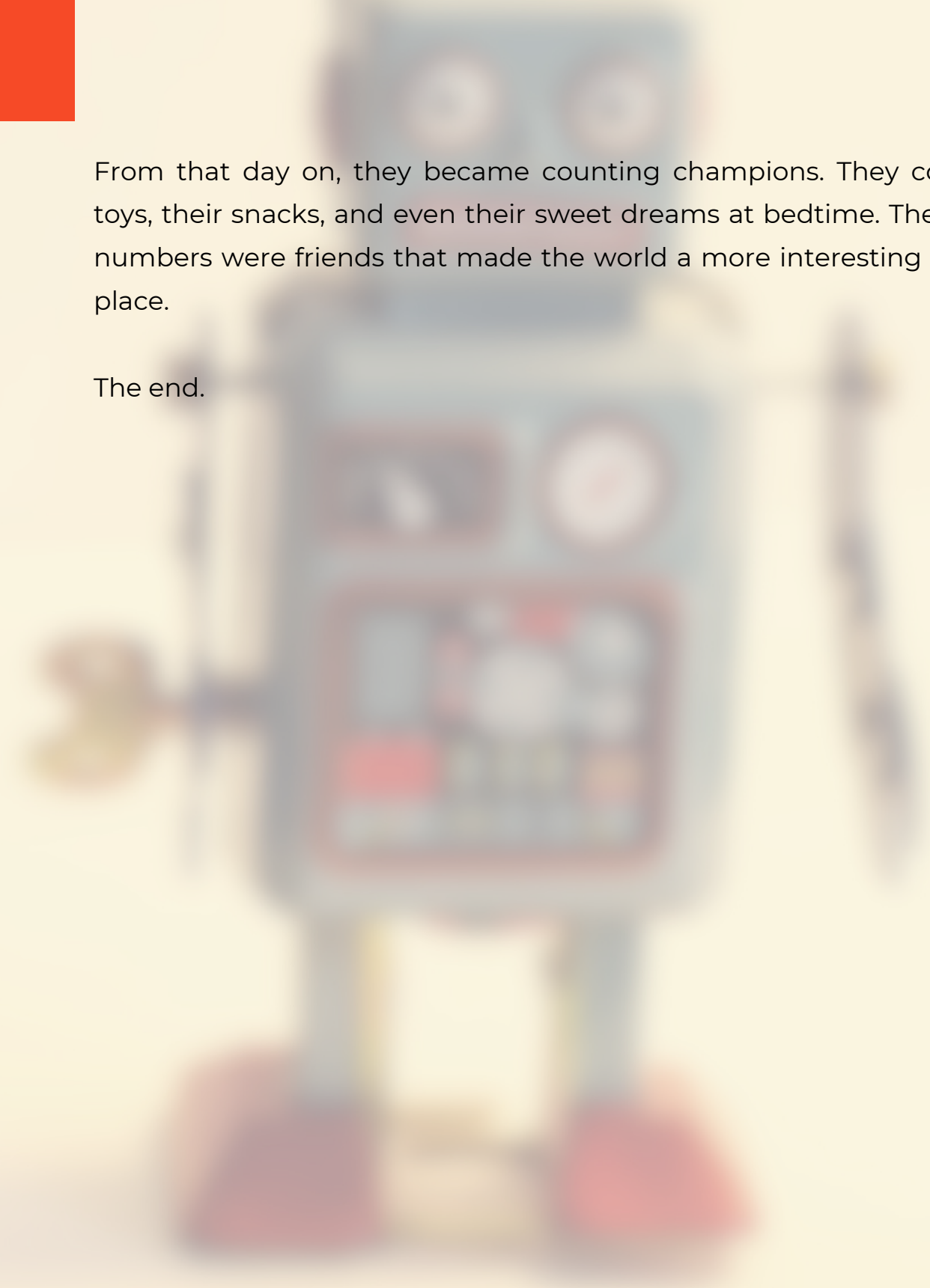
As they explored, they discovered that the forest was full of numbers. They counted butterflies with colorful wings, apples on the trees, and even clouds in the sky.

The friends realized that counting was like a fun game, and they laughed as they counted together. They found out that numbers were everywhere, and they could use them to play and learn.

The Counting Adventure - I

From that day on, they became counting champions. They counted their toys, their snacks, and even their sweet dreams at bedtime. They knew that numbers were friends that made the world a more interesting and exciting place.

The end.



The Weather Wizard

In a friendly village, there lived a wise wizard named Wizard Will. He was known as the "Weather Wizard" because he could predict the weather using magic.

One sunny morning, the children of the village gathered around Wizard Will. They were curious about how he knew what the weather would be like each day.

Wizard Will smiled and began to explain. He told them that he used special spells to understand the weather. He watched the clouds, listened to the wind, and felt the warmth of the sun to make his predictions.

The children were fascinated and wanted to learn about the weather too. So, Wizard Will showed them how to feel the air, look at the sky, and even see the rainbows that appeared after the rain.

The Weather Wizard - I

They learned that when the sky was bright and clear, it meant a sunny day for playing outside. When fluffy clouds gathered, it might rain, and they should bring their umbrellas.

Wizard Will and the children became weather watchers together. They noticed the changing seasons and learned about rain, snow, and sunshine. They also saw beautiful rainbows and felt the gentle breeze on their faces.

From that day on, the children and Wizard Will became weather experts. They knew that understanding the weather was like a magical adventure, and it made their village a fun and exciting place to live.

The end.

Resources

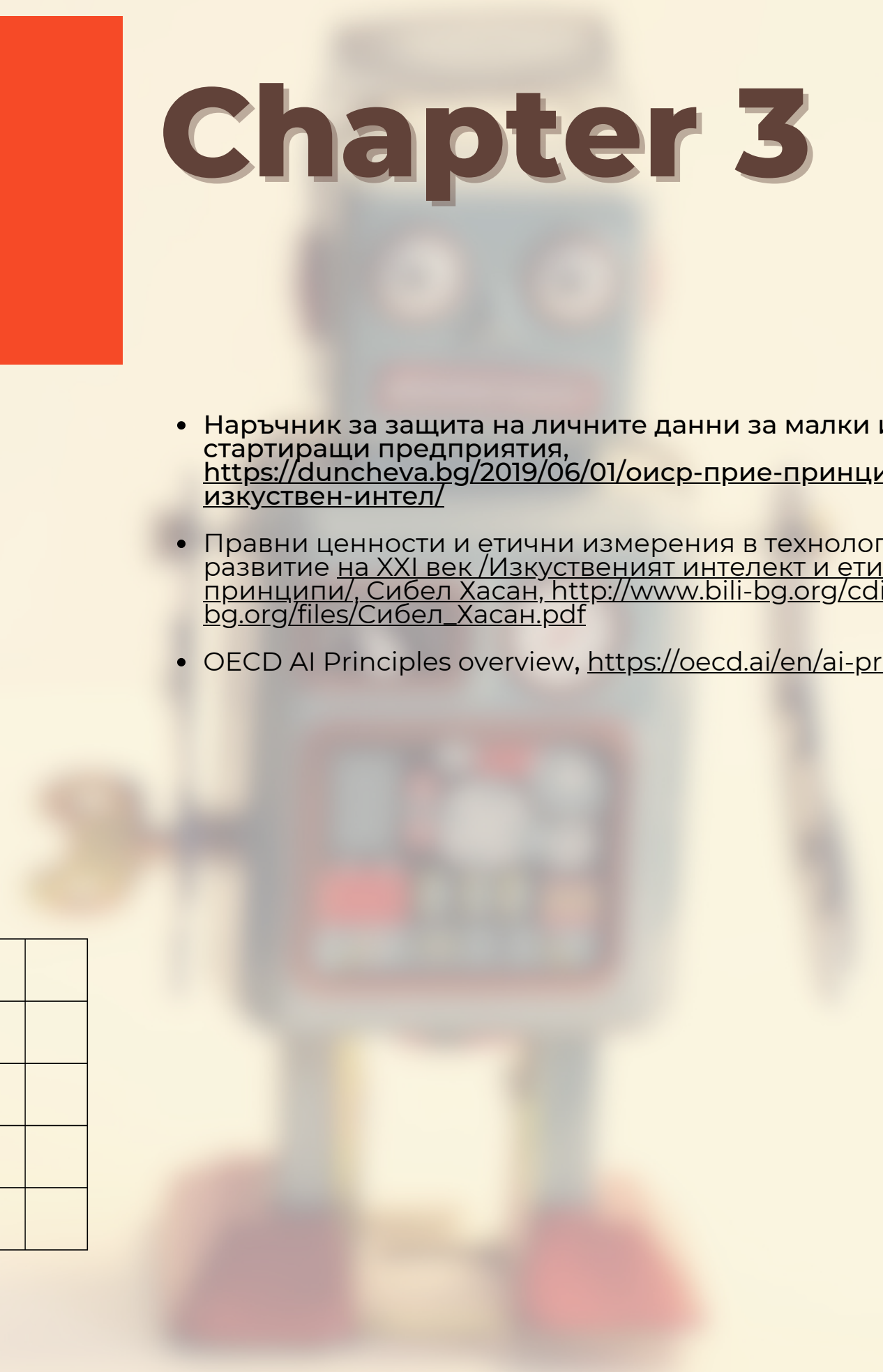
Chapter 1

- Fazlagić Jan (scientific editor), Artificial intelligence (AI) as a megatrend shaping education. How to prepare for socio-economic opportunities and challenges related to artificial intelligence?, Educational Research Institute, Warsaw 2022.
- Leżańska Wiesława, Płóciennik Elżbieta, Pre-school pedagogy with methodology, University of Lodz Publishing House, Lodz 2021.
- Różycka Ewa (lead editor), Pedagogical Encyclopedia of the 21st Century, volume VI, Wydawnictwo Akademickie "Żak", Warsaw 2007.
- www.sas.com.pl

Chapter 2

- European Commission
- https://blog.solides.com.br/inteligencia-artificial-e-o-mercado-de-trabalho/
- https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence

Chapter 3



- Наръчник за защита на личните данни за малки и стартиращи предприятия, https://duncheva.bg/2019/06/01/оиср-прие-принципи-за-изкуствен-интел/
- Правни ценности и етични измерения в технологичното развитие на XXI век /Изкуственият интелект и етичните принципи/, Сибел Хасан, http://www.bili-bg.org/cdir/bili-bg.org/files/Сибел_Хасан.pdf
- OECD AI Principles overview, https://oecd.ai/en/ai-principles

Chapter 4

We inspired by books:

- *CODEWEEK LEKCE PRO 1. – 3. TŘÍDU*. (23. 11. 2022). Načteno z https://digikoalice.cz/wp-content/uploads/2021/08/cw21-metodika-lekce-1-3-trida.pdf

Chapter 5

- *Što se događa na tržištu rada u regiji i EU*. preuzeto 21.11.2022. sa https://www.moj-posao.net/Vijest/82568/Sto-se-dogadja-na- trzistu-rada-u-regiji-i-EU/
- Most in-demand jobs. Preuzeto 21.11.2022. sa https://business.linkedin.com/talent-solutions/recruiting-tips/thinkinsights-emea/most- in-demand-jobs-and-industries-in-europe-middle-east-and-.latin-america.
- Božiković, N. *Tržište rada u Europskoj uniji i Republici Hvratskoj* preuzeto 19.11.2022. sa https://hrcak.srce.hr/file/374576
- Ključni izazovi za Europska tržišta rada. Preuzeto 9.11.2022. sa http://erc-online.eu/wp-content/uploads/2014/04/2008-01866-E.pdf
- *Umjetna inteligencija: prilike i prijetnje*. Europski parlament. Preuzeto 15.11.2022. sa https://www.europarl.europa.eu/news/hr/headlines/society/20200918STO87404/umjetna-inteligencija-prilike-i-prijetnje

Chapter 6

- Lead Your School's Curriculum Process With A Strategic Plan - Atlas. (2018, February 28). Retrieved November 25, 2022, from https://www.onatlas.com/blog/lead-your-schools-curriculum-process-with-a-strategic-plan
- 7 curriculum planning tips that will make your school year easier - Classcraft Blog. (2019, December 19). Retrieved November 25, 2022, from https://www.classcraft.com/resources/blog/curriculum-planning-tips/
- Elements of Curriculum – Educare. (2021, May 24). Retrieved November 25, 2022, from https://educarepk.com/elements-of- curriculum.html
- Vontz, T., & Goodson, L. (n.d.). Module 6: Curriculum Planning – EDCI 702: Curriculum, Instruction, and Assessment. Retrieved November 25, 2022, from https://kstatelibraries.pressbooks.pub/EDCI702/chapter/module-6-curriculum-planning/
- https://www.onatlas.com/wp-content/uploads/2019/02/componentscurriculumplan.pdf
- https://chiefsforchange.org/wp-content/uploads/2020/07/Curriculum-Implementation-Guide.pdf
- https://www.pivotlearning.org/curriculum-implementation-planning-toolkit/?utm_source=c-website&utm_medium=core&utm_term=curriculum-implementation-showcase&utm_content=curriculum_instruction&utm_campaign=c-website-curriculum-implementation-showcase
- https://www.education.vic.gov.au/PAL/fiso-curriculum-planning-and-assessment-implementation-guide.pdf
- https://www.niet.org/assets/1da4c1fbd6/high-quality-curriculum-implementation.pdf
- kosovotpd.eu/wp-content/uploads/2019/12/planning-for-curriculum-implementation-1.pdf

Stay tuned!

info@eurasiavision.eu

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