

SAINT Curriculum

UNIT 2: Application of AI in Work and Entrepreneurship

Deliverable: WP2/2.2



SAINT

HANDS ON INTRODUCTION TO ARTIFICIAL
INTELLIGENCE IN PRIMARY EDUCATION
USING MINECRAFT

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Contents

1	Introduction of the project	4
1.1	The scope of the project	4
1.2	The target groups	4
1.3	The purpose of this document	5
2	Glossary of the Unit	5
3	Introduction of the Unit.....	6
3.1	Description	6
3.2	Learning objectives & outcomes	6
3.3	Estimated seat time	6
4	Course content of the Unit	7
4.1	Introduction.....	7
4.2	Idea 1: Perception	7
4.3	Idea 2: Representation & reasoning	9
4.4	Idea 3: Learning	10
4.5	Idea 4: Natural interaction.....	11
4.6	Idea 5: Societal impact	12
4.7	Case Studies & Success Stories	14
5	Additional materials and resources	15
6	Wrap-up	16
7	Quiz.....	16
8	References	17

1 Introduction of the project

1.1 The scope of the project

Working as an ideal digital learning environment to teach children about the practical applications of AI based on the AI4K12 project guidelines, the motivation for this project comprises the following goals:

- Introduce pupils, teachers and educators to AI concepts, its impacts on our society and related practical implementations,
- Address the growing need to develop remote learning solutions facilitating student engagement, creativity, problem-solving and decision-making skills,
- Upskill the teachers and educators with new sets of skills (PBL, AI, gamification etc) developed through innovative ways of teaching,
- Improve engagement rates in children through the use of an innovative way of teaching, helping children develop creativity,
- Reduce the gap between need and availability for AI related skills.

AI Adventures in Minecraft teaches AI related skills to children aged from 9-12 years old, using a Minecraft World. With this, we create a fun, interactive and creative learning environment through specific activities and challenges aligned with the AI4K12 guidelines (ai4ka12.org) and the 5 big ideas of AI: 1) Perception, 2) Representation & Reasoning, 3) Learning, 4) Natural interactions, 5) Societal impact.

To that end, the project develops and promotes the following tangible results:

- This curriculum: a complete learning course for introducing AI in school teaching based on the 5 big ideas of the AI4K12 framework. The course disseminates knowledge about AI4K12's AI education guidelines and the 5 big ideas, explore the impact of AI in our society and enhance understanding of relevant concepts.
- A tailored Minecraft world (AI Adventures World) delivering educational challenges based on the learning course. It makes use of the escape room concept and offer Problem Based Learning activities. One challenge for each unit or lesson.
- The foundry virtual space supporting a growing community of adopters of SAINT and guiding the corrective/perfective and evolutive maintenance of the training package.

1.2 The target groups

The project sees the direct involvement of teachers, mainly teachers of children aged from 9-12 years old or Higher Education staff involved in the teaching of educators. These teachers are either teachers of STEM subjects or have some knowledge and interest in AI and/or Minecraft.

Concerning the Indirect target groups identified, the following can be involved:

- STEM centres looking to develop their catalogue of innovative teaching technologies or their catalogue of product enhancing AI knowledge,
- Higher education institutions collaborating with companies / public authorities engaged in the creation of educational material,
- Organisation, associations or networks looking to provide parents and or educators with educational material on AI: such as coding clubs, adult learning centres, entrepreneurial coaching services, continuing education centres, etc.

1.3 The purpose of this document

The work package n°2 - AI4K12 Educational Programme focuses on producing a complete course on AI with a set of 5 challenges in the related Minecraft World to illustrate the practical implementation of the technology.

This AI Curriculum is composed of a total of 5 units of pedagogical material based on the AI4K12 education guidelines and the learning objectives put into light following national surveys:

1. Application of AI in Machine learning,
2. Application of AI in Work and Entrepreneurship,
3. Application of AI in Speech & vision,
4. Application of AI in Games & puzzles,
5. Application of AI in everyday life.

Additionally, a glossary is created in each Unit in order to ease the adoption of the SAINT package by the teachers and schools.

2 Glossary of the Unit

Words	Definition
Algorithm	An algorithm is a set of steps that reliably solve certain types of problems, such as sorting things alphabetically or doing long division.
Automation	Automation is the act or process of controlling machines or devices in a more automatic way, such as by computer or electronic controls.
Defect	A defect in something is a mistake or problem that makes the thing not perfect.
Efficiency	Efficiency is the state or quality of being efficient.
Entrepreneur	An entrepreneur is a person who organizes and operates a company and assumes much of the associated risk.
Generative	Generative AI is a type of artificial intelligence technology that can produce various types of content including text, imagery, audio and synthetic data.
Manufacturing	The process of making something.
Neural network	Neural networks are a series of algorithms that mimic the operations of a brain to recognize relationships between vast amounts of data.

Prediction	A prediction is a guess of the chance something will happen based on data.
Productivity	The fact of being able to achieve great results from doing something.
Retail	Retail is selling things, usually in small amounts.
Workforce	The people engaged in or available for work, either in a country or area or in a particular firm or industry.

3 Introduction of the Unit

3.1 Description

This module is about artificial intelligence (AI) and its applications in work and entrepreneurship under the prism of the five key areas of AI4K12: perception, representation and reasoning, learning, natural interaction, and societal impact.

3.2 Learning objectives & outcomes

In this Unit, learners will become acquainted with the growing importance of Artificial Intelligence in the professional world and entrepreneurship, in a wide variety of domains and industries.

On successful completion of this Unit, learners should be able to:

- Outcome 1: understand the fundamental concepts and workings of AI, and how they can be used in the professional world.
- Outcome 2: identify various areas where AI can be applied in different work and entrepreneurship scenarios, such as healthcare, finance, retail, manufacturing, and marketing.
- Outcome 3: understand how to think like an entrepreneur and identify opportunities to apply AI in a business context.
- Outcome 4: understand the ethical and legal implications of using AI in work and entrepreneurship and how to ensure that these considerations are addressed.
- Outcome 5: acquire practical skills in using AI tools and techniques to solve business problems and improve decision-making.

3.3 Estimated seat time

The completion of the module along with the implementation of the knowledge provided will last 6 hours.

4 Course content of the Unit

4.1 Introduction

This module is about artificial intelligence (AI) and its applications in work and entrepreneurship through the prism of the five key areas of AI4k12: perception, representation and reasoning, learning, natural interaction, and societal impact.

There are a lot of – probably legitimate – fears when it comes to AI used in the workplace and entrepreneurship, the most common question being: will AI replace us?

“The structure of the workforce is changing, but I don’t think artificial intelligence is essentially replacing jobs,” Dr. Hossein Rahnama, founder and CEO of AI concierge company Flybits and visiting professor at the Massachusetts Institute of Technology said. *“It allows us to really create a knowledge-based economy and leverage that to create better automation for a better form of life. It might be a little bit theoretical, but I think if you have to worry about artificial intelligence and robots replacing our jobs, it’s probably algorithms replacing white-collar jobs such as business analysts, hedge fund managers and lawyers.”* (Uzialko, 2023)

In addition, *“while AI may cause some job losses, they are likely to be broadly offset by new jobs created due to a stronger and wealthier economy made by AI technologies. In 2020, it was predicted that AI would eliminate 1.8 million jobs and create 2.3 million new jobs. By 2025, growing job demand for 97 million people will be needed for jobs such as AI and machine learning specialists, process automation specialists, big data specialists, and more”.* (Todorov, 2021)

AI can be seen as a supporting tool, facilitating some tasks, helping people concentrate on more value-added ones, and thus keeping more time to innovate.

The value AI has is complex, and we will try to explore it in this Unit.

4.2 Idea 1: Perception

AI perception in work and entrepreneurship refers to the ability of AI systems to sense and interpret the environment around them, using various forms of input such as images, video, audio, and other sensor data. This involves using algorithms and machine learning techniques to analyze and interpret sensory data, recognize patterns, and make predictions or decisions based on that data.

In the context of work and entrepreneurship, AI perception can be used in a variety of ways, such as improving manufacturing processes by using computer vision to monitor production lines and identify defects or enhancing customer service by using natural language processing to understand and respond to customer inquiries.

AI perception is an important aspect of AI that enables machines to interact with and understand the world around them, which has numerous applications in work and entrepreneurship.

Below, some concrete examples of AI perception in work and entrepreneurship:

1. **Fraud detection:** AI perception can be used to detect fraud in financial transactions. Machine learning algorithms are trained to identify patterns in transaction data that suggest fraudulent behavior, such as unusual spending patterns or geographic anomalies. This helps financial institutions to detect and prevent fraud in real-time.
2. **Quality control:** AI-powered cameras and sensors can be used to monitor production lines and detect defects in real-time, reducing the likelihood of defective products reaching customers. For example, an automotive manufacturer might use computer vision to identify defects in car parts as they move down the assembly line. The AI system can be trained to recognize various types of defects, such as scratches, dents, or misalignments, and alert human operators to correct the issues. This helps to improve the overall quality of the product and reduce the cost associated with returns and repairs.
3. **Customer service:** AI perception can be used in customer service to analyze and understand customer sentiment. Retailers can use cameras and sensors to track customer movements and interactions with products and analyze the data to make recommendations or improve store layout.
4. **Retail analytics:** AI perception is used in retail to analyze shopper behavior and preferences. Computer vision algorithms can be used to track shopper movements, identify popular products, and analyze shopping patterns. For example, a retailer might use computer vision to track how customers navigate through a store and which products they spend the most time interacting with. This data can then be used to optimize store layouts or make personalized product recommendations to customers.
5. **Healthcare:** AI perception can be used in healthcare to diagnose and monitor medical conditions. For example, AI-powered cameras can be used to analyze medical images such as X-rays, MRIs, or CT scans to identify potential health issues. This can help to improve diagnosis accuracy and reduce the time and cost associated with traditional methods.



Figure 1 Production line (pixabay.com)

4.3 Idea 2: Representation & reasoning

AI representation and reasoning refers to the ability of AI systems to represent and manipulate knowledge and make decisions based on that knowledge. This involves creating models and structures to represent information, and algorithms for reasoning about that information.

Below, some concrete examples of AI representation and reasoning in work and entrepreneurship:

1. **Fraud detection:** AI representation and reasoning can be used to identify and prevent fraud in financial transactions. Bayesian networks and other probabilistic models are used to reason about patterns in transaction data to identify potentially fraudulent activities.
2. **Customer service:** AI representation and reasoning can be used to personalize customer service interactions. Knowledge representation techniques such as semantic networks are used to represent customer data and preferences, which can then be used to customize responses to customer inquiries.
3. **Healthcare diagnosis:** AI representation and reasoning can be used to diagnose and treat medical conditions. Knowledge-based systems that reason about medical knowledge can be used to make diagnoses and recommend treatments.
4. **Cybersecurity:** AI representation and reasoning can be used to detect and prevent cybersecurity threats. Machine learning algorithms can reason about patterns in network traffic to identify potential threats, while expert systems can be used to reason about security vulnerabilities and recommend remediation strategies.
5. **Supply chain management:** AI representation and reasoning can be used to optimize supply chain management. Multi-agent systems that reason about supply chain data can be used to predict demand, optimize inventory, and improve logistics.



Figure 2 Cybersecurity (pixabay.com)

4.4 Idea 3: Learning

AI learning refers to the ability of AI systems to improve their performance over time by analyzing and learning from data. In work and entrepreneurship, AI learning can be used for a wide range of applications, from predictive analytics to recommendation engines to autonomous systems.

Below, some concrete examples of AI learning in work and entrepreneurship:

1. **Predictive maintenance:** AI learning can be used to predict and prevent equipment failures in manufacturing and industrial settings. Machine learning algorithms can analyze historical data on equipment performance and maintenance to predict when maintenance is needed, minimizing downtime and reducing maintenance costs.
2. **Financial analysis:** AI learning can be used to analyze financial data and make predictions about market trends and investments. Deep learning algorithms can analyze vast amounts of financial data to identify patterns and make recommendations for investments.
3. **Natural language processing:** AI learning can be used to understand and generate natural language, improving customer service and communication. Natural language processing algorithms can analyze customer inquiries and generate automated responses, providing faster and more accurate customer service.
4. **Recommendation engines:** AI learning can be used to recommend products and services to customers based on their preferences and behavior. Machine learning algorithms can analyze customer data to identify patterns and make personalized recommendations, improving customer satisfaction and sales.
5. **Autonomous drones:** AI learning can be used to control and navigate autonomous drones for a variety of applications, such as delivery, surveying, and inspection. Reinforcement learning

algorithms can be used to train drones to navigate complex environments and perform tasks with greater accuracy and efficiency.



Figure 3 Drone (pixabay.com)

4.5 Idea 4: Natural interaction

AI natural interaction involves the ability of machines to understand and respond to human natural language and behaviors, such as speech and gestures. It is an important aspect of AI that has been increasingly used in various work and entrepreneurship applications.

Below, some concrete examples of AI natural interaction in work and entrepreneurship:

1. **Voice assistants:** AI natural interaction can be used to develop voice assistants for customer service, such as Amazon's Alexa and Apple's Siri. Natural language processing and speech recognition technologies are used to enable customers to interact with these assistants using voice commands.
2. **Chatbots:** AI natural interaction can be used to develop chatbots for customer service and sales, such as those used by H&M and Sephora. Natural language processing and machine learning algorithms are used to enable customers to interact with these bots using text or voice commands.
3. **Virtual assistants:** AI natural interaction can be used to develop virtual assistants for administrative and productivity tasks, such as Google's Duplex and Microsoft's Cortana. Natural language processing and machine learning algorithms are used to enable users to interact with these assistants using voice or text commands.
4. **Gesture recognition:** AI natural interaction can be used to develop gesture recognition systems for hands-free control of devices, such as Microsoft's Kinect and Intel's RealSense. Machine

learning algorithms are used to analyze images and recognize gestures, allowing users to interact with devices without physical contact.

5. **Emotion recognition:** AI natural interaction can be used to develop emotion recognition systems for improving customer experiences, such as those used by Disney and Delta Airlines. Machine learning algorithms are used to analyze facial expressions and body language to recognize emotions and tailor experiences accordingly.

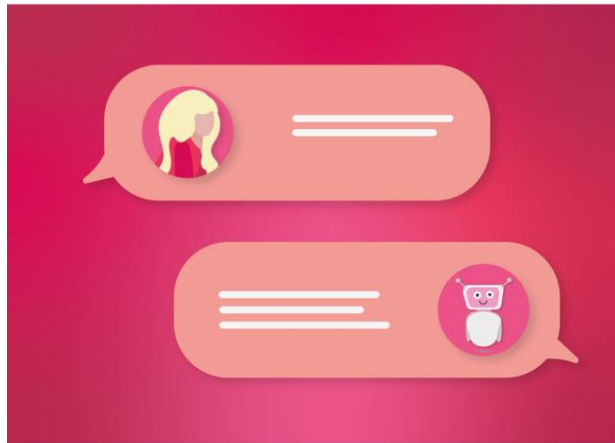


Figure 4 Chatbot (pixabay.com)

4.6 Idea 5: Societal impact

AI has a significant societal impact in work and entrepreneurship, both positive and negative. Some of the positive impacts of AI include increased efficiency, productivity, and innovation, while negative impacts include job displacement, ethical concerns, and bias. In addition, it's important to note that AI societal impact is not just about how it's being used in work and entrepreneurship, but also about its potential consequences on society as a whole.

Below, some concrete examples of AI societal impact in work and entrepreneurship:

1. **Job displacement:** One of the most significant societal impacts of AI in work and entrepreneurship is the potential for job displacement. As AI systems become more advanced, they may be able to perform tasks that were previously done by humans, leading to job losses in certain industries.
2. **Improved productivity and efficiency:** On the other hand, AI has the potential to improve productivity and efficiency in the workplace, leading to economic growth and increased job opportunities. AI-powered systems can automate routine tasks, allowing employees to focus on higher-level tasks that require creativity and critical thinking.

3. **Ethical decision-making:** AI societal impact can be used to develop ethical decision-making frameworks for businesses, such as the AI Ethics Guidelines by the European Commission. These frameworks help businesses make ethical decisions when implementing AI technologies.
4. **Ethical concerns:** The use of AI in work and entrepreneurship raises ethical concerns related to bias, privacy, and accountability. For example, AI systems may inadvertently perpetuate biases against certain groups of people, leading to unfair outcomes.
5. **Social responsibility:** AI societal impact can be used to promote social responsibility among businesses that use AI technologies, such as the AI for Good initiative by the United Nations. These initiatives encourage businesses to use AI to address social and environmental challenges, such as climate change and poverty.
6. **Privacy and security:** AI societal impact can be used to address privacy and security concerns related to AI technologies, such as the General Data Protection Regulation (GDPR) by the European Union. These regulations help ensure that businesses using AI technologies protect the privacy and security of user data.
7. **Education and training:** AI societal impact can be used to promote education and training in AI technologies, such as the AI for Everyone program by Coursera. These programs help ensure that the workforce is prepared for the increasing use of AI technologies in various industries.
8. **Cybersecurity risks:** The use of AI in work and entrepreneurship also raises cybersecurity risks, as AI systems may be vulnerable to attacks and data breaches. Companies that use AI must take steps to ensure the security of their systems and protect sensitive data.

These examples demonstrate how AI societal impact is being addressed in various industries and contexts to promote ethical, fair, and responsible use of AI technologies.



Figure 5 Ethics (shutterstock.com)

4.7 Case Studies & Success Stories

4.7.1 Example 1: Deepmind

<https://www.deepmind.com/>

DeepMind is an artificial intelligence technology and a research company that uses neural networks and machine learning to crack a broad range of problems. The company DeepMind began as a London-based startup in 2010 and was acquired by Google in 2014. It's now a subsidiary of Alphabet Inc., the parent company of Google. They have developed a range of applications for its technologies, including healthcare and gaming. For example, the company developed an AI system that can diagnose eye diseases as accurately as human doctors, and it also developed an AI system that can play and beat human champions at complex games like Go and Chess. These efforts have demonstrated the potential for AI to revolutionize various industries and solve complex problems. (Pappas, 2022)

4.7.2 Example 2: Grammarly

<https://www.grammarly.com/>

Grammarly is an AI-powered writing assistant that helps users improve their writing skills by detecting and correcting grammatical errors, spelling mistakes, and writing style issues. The company used machine learning algorithms to train its AI model on large amounts of writing data, achieving high accuracy and user satisfaction. Grammarly has grown into a successful company, with millions of users and a valuation of over \$1 billion. Good writing skills can enrich anyone's life but are particularly important for entrepreneurs. Indeed, professionals with fewer grammar errors may achieve higher positions. For entrepreneurs, this could mean the difference between gaining or losing a customer—or even succeeding or failing at the business. (Steimle, 2013)

4.7.3 Example 3: UrbanistAI

<https://urbanistai.com/>

UrbanistAI is a generative AI platform enabling citizens and stakeholders for participatory planning and co-design. Participants can use natural language to quickly create urban design scenarios so they can communicate their ideas using images, even if they have no design experience. The tool is used by designers, consultants and civil servants to lead participatory planning programs and co-design workshops. Details and urban furniture can be added from presets on the go or directly drawn by hand. UrbanistAI was created by Toretei (a design consultancy, software and Academy involved in AI R&D) and Spin Unit (strategic urban research unit working for equitable transformation in regions, cities and public space).

5 Additional materials and resources

Type of resource	Title	Topic	Link
Online article	The basics of AI for beginners	Main concepts revolving around AI and the answers to frequently asked questions	https://dataconomy.com/2022/05/the-basics-of-artificial-intelligence/
Online article	3 Surprising Benefits of Artificial Intelligence in the Workplace	Multiple benefits of AI in the workplace, including some easy to miss, but can make a significant impact on a business	https://www.beekeeper.io/blog/3-reasons-you-want-ai-in-the-workplace/
Online article & video	5 Benefits of AI for Business	How implementing AI helps businesses achieve both their short and long-term goals	https://www.aitimejournal.com/benefits-of-ai-for-business/ https://www.youtube.com/watch?v=ORBDqMrvCLs
Video	AI Benefits and Advantages for People and Business AI with Alex	Benefits and advantages of AI for creating better human experiences and greater business success	https://www.youtube.com/watch?v=Va_KD-K4co8
Video	7 Ai Tools For Business That You Must Try	7 AI tools which help boost productivity, increase efficiency and drive growth.	https://www.youtube.com/watch?v=pjnCNRC_AbA
Video	6 A.I Tools That Could Help Your Small Business	6 A.I tools that could have an impact on how businesses market and run	https://www.youtube.com/watch?v=UAILccLxV1s

6 Wrap-up

In conclusion, AI has become an essential tool for businesses to enhance their operations and increase productivity. With its various applications such as perception, representation and reasoning, learning, natural interaction, and societal impact, AI has the potential to revolutionize work and entrepreneurship. While the technology offers immense benefits, it also presents challenges, including ethical concerns and potential job displacement. Nonetheless, with proper implementation and ethical considerations, AI has the potential to improve the lives of individuals and contribute to economic growth. As AI technology continues to advance, it will be exciting to see how businesses utilize it to drive innovation and growth.

7 Quiz

Question 1: What is the main goal of using AI in work and entrepreneurship?

- a) To replace human workers with machines
- b) To automate repetitive tasks and improve efficiency**
- c) To develop innovative products and services without human involvement

Question 2: What is the main advantage of using AI in work and entrepreneurship?

- a) Reducing costs
- b) Improving productivity
- c) Enhancing customer experience
- d) All of the above**

Question 3: Which of the following is an example of AI natural interaction in work and entrepreneurship?

- a) A voice assistant that helps users manage their schedule**
- b) An AI algorithm that predicts stock prices
- c) An autonomous vehicle that drives itself

Question 4: What is the process of training an AI model on data called?

- a) Natural interaction
- b) Representation and reasoning
- c) Learning**
- d) Societal impact

Question 5: How can AI be used in supply chain management?

- a) To predict demand and optimize inventory**
- b) To automate manufacturing processes
- c) To improve product design and innovation
- d) None of the above

Question 6: Which of the following is a concrete example of AI used in entrepreneurship?

- a) A hypothetical chatbot that provides financial advice

b) Grammarly, an AI-powered writing assistant

c) A theoretical AI algorithm that predicts weather patterns

Question 7: What are some potential ethical concerns of using AI in work and entrepreneurship?

a) AI bias and discrimination

b) Privacy and data protection

c) Cybersecurity threats

Question 8: Which of the following is NOT an example of AI in work and entrepreneurship?

a) A chatbot that assists customers with their inquiries

b) A machine that assembles products in a factory

c) A human manager who makes all business decisions

Question 9: How can AI improve decision-making in entrepreneurship?

a) By eliminating the need for human input

b) By providing data-driven insights and predictions

c) By making decisions based on gut feelings

Question 10: What is the main challenge of implementing AI in work and entrepreneurship?

a) The cost of AI technology

b) The lack of AI talent and expertise

c) The fear of AI taking over human jobs

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