
Università di Verona

Corso di Perfezionamento – Metodologico-didattico CLIL

Area Tecnico-Scientifica

A CLIL Module

**The Pioneers of Computer Science:
Alan Turing**

Docente:

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Scuola di appartenenza:

ISIS "Calabrese-Levi" di San Pietro in Cariano

Introduzione

Il modulo CLIL descritto di seguito è stato progettato per essere svolto in classi quinte del Liceo Scientifico con indirizzo Scienze Applicate. L'argomento affrontato è tra quelli indicati nelle linee guida ministeriali per il percorso liceale e offre molte occasioni di collegamento con argomenti che vengono proposti nelle altre discipline durante lo stesso anno.

Nel percorso del Liceo Scientifico con indirizzo Scienze Applicate, la materia Informatica occupa due ore settimanali per tutti e cinque gli anni di corso. Tra le competenze previste nel profilo dello studente in uscita dal percorso liceale è presente la capacità di effettuare collegamenti tra la materia e le altre discipline: sia quelle scientifiche ma anche con la filosofia, la storia e l'italiano, permettendo una riflessione sui fondamenti teorici dell'informatica e sulle sue connessioni con la logica.

Per quanto riguarda le TU 4 e 5, non ho previsto una fase finale di test perché gli argomenti sono di carattere generale e sono stati trattati in modo semplice e non approfondito: ho ritenuto importante inserirli per completare la panoramica sui lavori di Turing ma una trattazione più approfondita non sarebbe adatta a classi di liceo.

Progettazione del Modulo/UD

General frame work - Planning the CLIL Module/UD

School	ISIS "Calabrese-Levi" Liceo Scientifico opz. Scienze Applicate
Teacher – responsible for the CLIL project	Elisabetta Coltro
Class involved	Fifth classes
Subject involved	Computer Science
Cross-curricular links	History, Math
Level of language competence of the class	B1/B2
Resources Location, materials	Computer lab Computer connected to Internet Interactive Whiteboard Tv with dvd player

Descrizione del Modulo/UD

The CLIL Module/UD – General Plan

Module Title	The Pioneers of Computer Science: Alan Turing
Teaching Units	TU1 – Introducing the figure of Alan Turing TU2 – Biography of Alan Turing TU3 – The Turing Machine TU4 – Turing Test TU5 – The halting problem
Teacher	Elisabetta Coltro
Discipline	Computer Science
Timeline	<p>5Dsa: 10 lessons</p> <ul style="list-style-type: none"> - 3 lessons for UD1 and Step 1 of UD2 - 2 lessons for Steps 2-3-4 of UD2 - 1 lesson for Test of UD2 and Steps 1-2 of UD3 - 1 lesson for Step 3 of UD3 - 1 lesson for Step 4 of UD3 and Steps 1-2 of UD4 - 1 lesson for Test of UD3 and Step 3 of UD4 - 1 lesson for conclude UD4 <p>5Esa: 11 lessons</p> <ul style="list-style-type: none"> - 3 lessons for UD1 and Step 1 of UD2 - 2 lessons for Steps 2-3-4 of UD2 - 1 lesson for Test of UD2 and Steps 1-2 of UD3 - 1 lesson for Step 3 of UD3 - 1 lesson for Step 4 of UD3 and Steps 1-2 of UD5 - 1 lesson for Test of UD3 and Steps 3-4 of UD5 - 1 lesson for Steps 1-2-3 of UD4 - 1 lesson for conclude UD4
Content (subject)	<p>TU1 and TU2</p> <ul style="list-style-type: none"> - who Alan Turing was - Turing’s work during the Second World War - the main principles of cryptography - some events in Turing’s life - list of the main Alan Turing’s works - scientific context of Alan Turing’s life and work <p>TU3</p> <ul style="list-style-type: none"> - elements of Turing Machine - how Turing Machine works - theoretical applications of Turing Machine - why Turing have defined Turing Machine?

	<ul style="list-style-type: none"> - what is the <i>decision problem</i> ? - using Finite State Machine to define Turing Machine behavior - connection between Turing Machine and modern computers <p>TU4</p> <ul style="list-style-type: none"> - what is Turing Test - who/what is the "player" in Turing Test - applications of Turing Test - what is "intelligence" for a computer? - general concepts about Artificial Intelligence <p>TU5</p> <ul style="list-style-type: none"> - concepts of computability - concept of decidability/un-decidability - what the <i>halting problem</i> says
Materials	PP presentations Video materials from the Web Documents from Web sites Movie Activity sheets prepared by teacher (see the "Allegati")
Relevant webliography	http://www.turing.org.uk/index.html http://www.theguardian.com http://www.bbc.co.uk https://www.youtube.com http://www.elbot.com http://www.zutopedia.com/ https://en.wikipedia.org http://www.wordreference.com
Relevant bibliography	Andrew Hodges – "Alan Turing: The Enigma" (1983) Jon Agar – "Turing and the Universal Machine: The Making of the Modern Computer" (2001)
Pre-requisites: Content	Hardware structure of computer Definition of Algorithm and its characteristics Finite State Machine
Pre-requisites: Language	B1-B2 level
Objectives:	Increase and improve students' knowledge and competences

<p>Content</p>	<p>Know...</p> <ul style="list-style-type: none"> - who Alan Turing was - Turing's work during the Second World War - the main principles of cryptography - some events in Turing's life - scientific context of Alan Turing's life and work - elements of Turing Machine - how Turing Machine works - theoretical applications of Turing Machine - why Turing have defined Turing Machine? - what is the <i>decision problem</i> ? - what is Turing Test - who/what is the "player" in Turing Test - applications of Turing Test - what is "intelligence" for a computer? - general concepts about Artificial Intelligence - concepts of computability - concept of decidability/un-decidability - what the <i>halting problem</i> says <p>Be able to...</p> <ul style="list-style-type: none"> - describe the ALU and Control Unit - list of the main Alan Turing's works - list the component of Turing Machine - defining the functions of Turing Machine - using Finite State Machine to define Turing Machine behavior - comparing and contrasting: find similarity and differences between Turing Machine and modern computers
<p>Objectives: Language</p>	<p>Increase and improve students' knowledge and competences.</p> <p>Know...</p> <ul style="list-style-type: none"> - specific vocabularies used to talk about cryptography (for example: encryption, decryption, plain-text, cipher-text, cipher, key, cryptanalysis, brute-force search, ...) - specific vocabularies used to talk about computability theory (for example: undecidable, computable functions, recursion, formal language, ...) <p>Be able to...</p> <ul style="list-style-type: none"> - using the specific vocabulary of the subject in oral and/or written production - understanding a written text both globally and analytically (reading) - understanding a dialogue both globally and analytically (listening) - understanding a speaking lesson both globally and analytically (listening) - write a succession of questions and answer (writing)
<p>Objectives:</p>	<p>Related to Learning Skills</p>

Study Skills and Learning Skills	<ul style="list-style-type: none"> - remembering (thinking about things they know) - note taking - finding information on Web - summarizing - ordering - editing - predicting - comparing and contrasting - listing - defining - evaluating: give opinion about other's works <p>Related to Study Skills</p> <ul style="list-style-type: none"> - planning work - ask for help when necessary - cooperate with others - work independently
Cross-curricular objectives	<p>History</p> <ul style="list-style-type: none"> - Second World War <p>Math</p> <ul style="list-style-type: none"> - Algorithms - Theorems and proofs <p>Philosophy</p> <ul style="list-style-type: none"> - Ethic aspects of Artificial Intelligence
Procedures Classroom management	<ul style="list-style-type: none"> - Brainstorming activities - Short frontal explanation, always using visual support - Work in pairs - Work in PC lab
Assessment	<p>Formative assessment</p> <ul style="list-style-type: none"> - peer assessment - short exercises during activities - checking homework - questioning about what has already been learned (Do you remember the Turing's conclusion about the halting problem? -- Can you list the component of a Turing machine? ...) - observing students during lessons (he ask questions, he can concentrate, he can cooperate with other, ...) - monitoring learners' communication skills, cognitive skills and attitudes toward learning during class activities, recording, for example in a table, if he identifies evidences of the learner meeting one criterion <p>Summative assessment</p> <ul style="list-style-type: none"> - test with different types of questions
Remedial work / Reinforcement	<ul style="list-style-type: none"> - Homework - Using L1 if necessary