SCOO STEM EDUCATION



What is sCool?

sCool is a pedagogical tool for **STEM** education for high-school students (11-19 years old) which consists of:

- Interdisciplinary multi-platform mobile video game
- Web platform for creating adaptive learning content and tracking students' progress.
- Unity3d C# and ASP.NET MVC on Microsoft Azure







Game story

- Space mission crushed during space exploration.
- High school student receives a message for help.



- This teenager takes a robot and goes for a rescue mission.
- Player collects lost discs with software code which runs the space shuttle of astronauts.
- Some discs are damaged so the player has to fill in missing code parts and test it.

Video game

Programming course is used as a proof of concept.

For providing the best educational experience, the game is divided into two components where students can:

learn theoretical concepts by exploring undiscovered planet

- player is collecting lost disks
- running the software
- fixing damaged disks by providing a correct answer

practically apply gained knowledge by programming a robot

- robot is sent to pick up a disk on some dangerous places
- user controls the robot by typing the code
- solves provided tasks

Video game – list of courses



Video game – skill tree for selected course

Back	Skills	Highscores	
	Basics		
	Data Types		

Video game – selecting theoretical or practical task



Video game – planet exploration (theoretical tasks)

- Procedural map, content and sound generation
- Dynamic content (enemies and collectables) positioning
- Dynamic game balancing based on players progress (map size, health points, damage...)
- Multiplayer
 - Seed synchronization and map generation
 - Initial positions for the content
 - Player data synchronization



Video game – planet exploration (theoretical task)

Repair the disks Total 🗲 800

When compared with equivalent C++ or Java code, Python code is typically one-third to one-fifth their size which reduces the typing effort and increases readability. Python is designed to be highly readable. It uses English keywords frequently whereas the other languages use punctuations.

Which of these statements is true?

Python is easy-to-integrate

Python is easy-to-compile

Python is easy-to-read

Video game – robot missions (practical tasks)

- Python execution on mobile
- Accessing C# instances and functions from Python "robot.Up()"
- Debugging
- Custom virtual keyboard
- Custom Tabs system
- Custom drag-and-drop functionality
- Code reordering
- Code indentation



Web application

Web application consists of the following components:

- Creating a content for adaptive learning
- Adaptive learning mechanism
- Students' analytics for tracking students' progress and analyzing which concepts they had difficulties to grasp
- Web APIs for providing learning content and receiving analytics data from mobile game

Web application - courses

Course Management		
New Course 🕂		
Title	Description	
Programming	Programming course	2 C 💼
Mathematics	Mathematics course	2 C 💼

Web application – course skill tree

Course Details		
Title Description	Programming Programming course	
E Students		
Course Skills		
New Skill 🕇		
Title	Description	
Basics	Python Basics	
Data Types	Data Types in Python	
Strings	Strings	
Conditions	Conditions	
Loops	Loops	
Functions	Functions	

Web application – listing and creating tasks

Details				
Title Data Types Description Data Types in Python				
Theory Tasks				
New Theory Task +				
Title	Description		Difficulty (%)	
Select a correct output	A variable allows you to store a value by as	signing	10	201
Select a correct output	A variable allows you to store a value by as	signing	20	= 0 📋
Select a correct output	A variable allows you to store a value by as	signing	30	= Ø 💼
Select a correct output	A variable allows you to store a value by as	signing	40	s 🕜 💼
Select a correct output	A variable allows you to store a value by as	signing	50	= Ø 💼
Is it possible to reassign a variable in Python?	Variables can be reassigned as many times	as you	60	20
Which of the following variables contain a floating	Python has five standard data types : Numb	pers, St	70	= C 💼
Select a correct answer	>>> $x = 5$ >>> $y = $ >>> print(x + y) 12		80	= Ø 💼
Select correct variable assignment	print(myVar)		85	30
Select an option that will cause a ZeroDivisionErro	Dividing by zero in Python produces an erro	or, as n	90	= 0
Dreation Tanka				
May Practice Tack				
Title		Description	Difficulty (%)	
Use the print command to print the following calculati	on	print(2 + 2)	10	= C 💼
Use the print command to print the following calculati	on	print(5 + 14)	20	= Ø 💼
Use the print command to print the following calculati	on	print(52 + 3)	30	301
Use the print command to print the following calculati	on	print(5 + 4 - 3)	40	= Ø 💼
Print the output of calculation (7+2-6)		Python has the capability of c	50	201
Create a small program which prints result of the folio	owing calculation: >>>print(2 * (3 + 4))	Python also carries out multipl	60	s 🛛 💼
Solve the task from description area.		Define variables and print thei	70	= Ø 💼
Solve the task from description area.		Define variables and use the "	80	301
Python Arithmetic Operators - solve the task from the	bottom of the description field.	Assume variable a holds 10 a	90	= 0 💼

Create Theory Tas	sk
Title	What is Python?
Description	Python is a high-level programming language, with applications in numerous areas, including web programming, scripting, scientific computing, and artificial intelligence.
Correct Answer	Programming language
Incorrect Answer 1	
Incorrect Answer 2	The Incorrect Answer 1 field is required.
Hint	The Incorrect Answer 2 field is required.
Difficulty	The Difficulty field is required.
	H Save

Web application – analytics



Web application – student's skill



Course Unlocked (%)

tree

33 % U	nlocked		
Skill Tree Overview			
Skill	Statistics	Unlocked	Skill Mastered (%)
Basics	Theory Reactice	\odot	73 % Mastered
Data Types	Theory	\odot	30 % Mastered
Strings	Theory 🖉 🗮 Practice	\otimes	
Conditions	Theory 🖉 Practice	\otimes	
Loops	Theory R Practice	⊗	

Web application – student's skill statistics

View Details view Details wikill Mastered (%)	View Details	Mastered	0	View Details	0	View Details	
ikill Mastered (%) Details Ø What is Python?	73 %	Mastered					
Oetails	73 %	Mastered					
Øetails Ø What is Python?							
Ø What is Python?							
Result: Passed							
Task: What is Python?							
Task Solution: Programming language							
Task Difficulty: 50%							
Provided Answer: Programming language	e						
Attempts: 1							
Session Duration: 28 seconds							
Earned Points: 300							
Character's Health: 70%							
Date: 8/29/2017 5:23:17 PM							
Task Details >>							
 Which of these statements is true? 	?						
Python is							

