ADAPT EPE Education Strand >>Second Level – Collaborative and Creative Problem-Solving

ADAPT has identified 'collaborative and creative problem-solving' as a key skillset to leverage digital media innovations and to enhance how we interact with future digital media and information. The ADAPT EPE Education strand aims for Second level Education for 2018 are:

- Post Primary School: Enhance students' problem-solving skills and increase their confidence in tackling complex problems.
- Ensure that talented young problem-solvers see clear links between their love of problem solving and STEM career pathways.

The ADAPT mid-term international review in 2017 praised ADAPT's focus on the underlying skill of problem solving rather than fostering narrower skills in specific subject areas. The review panel's report stated that:

"ADAPT EPE programs are already at an advantage by shining a spotlight on the fundamental skill of problem solving, and avoiding a singular focus of learning to code."

Initiative: ADAPT AILO – the Problem Solvers' Challenge (AILO)

These overview tables present the goals and expected learning outcomes for students taking part in each round of AILO (Participation, Workshops, Participation Round, National Final, and IOL), the links to the Junior Certificates (JC) curriculum key skills / statements of learning and the OECD PISA (2012/2015) problem solving competencies and evaluation / assessment technique.

PISA (2012) defines problem-solving competence as the capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious. It includes the willingness to engage with such situations in order to achieve one's potential as a constructive and reflective citizen. PISA (2015) focuses on Collaborative Problem Solving (CPS) as a critical and necessary skill used in education and in the workforce. The full text of the AILO Junior Certificate links is in the AILO Key Junior Cert Skills document.

Goals - Participation Round of AILO		
Students	**Teachers**	**ADAPT**
Developing a positive disposition towards investigating, reasoning and problem-solving.	Teachers create time / space within the school week to engage with a new way of problem-solving.	Increased STEM engagement - 4,500+ students learn why problem solving is important.
Students learn basic logic skills via the online portal.	Teachers freely access puzzle materials on the ADAPT online portal.	Students understand collaborative and creative problem-solving' as a key skillset to leverage digital media innovations.
Students are motivated to undertake further problem-solving activities (workshops, AILO Preliminary Round)	Teachers register their students for an ADAPT problem-solving workshop.	5 ADAPT members needed for logic pack creation.

Expected Learning Outcomes – Participation Round of AILO				
Students learn about	**Students should be able to:**	**JC Coding**	**JC Maths**	**PISA Competencies**
Importance of problem solving skills and links to ADAPT work Introductory Logic puzzles Introduction to the 6 types of AILO puzzle	1.1 Discuss the importance of problem solving skills with their peers 1.2 Complete introductory logic puzzles 1-10 1.3 Recognise the 6 types of AILO puzzle – number systems, semantics, writing systems, phonetics, syntax, morphology.	✓	✓	Exploring and understanding the information provided with the problem.
Evaluation	Online portal downloads, registrations and survey attached to monthly download packs			
Assessment	Pre-& Post Surveys, December teacher survey			

Goals - Problem-Solving Workshops		
Students	**Teachers**	**ADAPT**
Improve confidence in their problem-solving ability. Improve their problem-solving strategies. Express ideas clearly and accurately Improve their likelihood of progressing to AILO National Final. Improve collaborative problem-solving	Teachers attending learn new skills for teaching problem-solving, which can be applied to other subjects. Teachers register their students for the ADAPT AILO Preliminary Round.	Increased STEM uptake from C2DE, females and low STEM access areas. Increased likelihood to undertake ADAPT-relevant STEM topics at University. Students understand collaborative and creative problem-solving' as a key skillset to leverage digital media innovations. 18 ADAPT members develop materials and then deliver the workshops nationwide.

Expected Learning Outcomes – Problem-Solving Workshops				
Students learn about	**Students should be able to:**	**JC Coding**	**JC Maths**	**PISA Competencies 2012 (and collaborative (2015)**
ADAPT tutor's career path & ADAPT research background Seeing patterns and trends in complex logic puzzles	1.1 Discuss the importance of problem-solving skills as a key component in a STEM career. 1.2 Complete logic puzzles 10-20 1.3 Recognise features that will make a language rule.	✓	✓	Exploring and understanding the information provided with the problem. Representing and formulating: constructing graphical, tabular, symbolic or verbal representations of the problem situation and formulating hypotheses

Problem solving strategies for each of the 6 types of AILO puzzle. Collaborative problem-solving techniques Expressing ideas clearly and accurately Gathering, interpreting and representing data	1.4 Understand when and how to use tables and charts to decipher data for each problem type (number systems, semantics, writing systems, phonetics, syntax, morphology.) 1.5 Describe the observations they made about the language with concise and complete rules. 1.6 Work as a team and reflect on their role in the team.	 ✓ ✓	✓	about the relevant factors and relationships between them. Planning and executing: devising a plan by setting goals and sub-goals, and executing the sequential steps identified in the plan. Employing logic and reasoning and (where relevant) working collaboratively to arrive at the optimal solution to a problem. Monitoring and reflecting: monitoring progress, reacting to feedback, and reflecting on the solution, the information provided with the problem, or the strategy adopted.
Evaluation	Pre- and post- workshop surveys.			
Assessment	Progression to and performance in Participation Round.			

Goals - AILO Preliminary Round		
Students	**Teachers**	**ADAPT**
Improve confidence in their problem-solving ability. Test themselves with one of each problem-type in competition. Qualify for AILO National Final and attend a nation-wide final with their peers.	Teachers receive follow-up problem-solving materials for non-qualifying and qualifying students. Non-qualifying schools will get first preference for workshop locations for the following year.	32-county uptake in the Preliminary Round. 1400 students participate. Direct correlation between workshop attendance and performance in the Preliminary Round. Increased interest of students to undertake ADAPT-relevant STEM topics at University. 20 ADAPT members attend training for a marking scheme / correct the Preliminary Round.

Expected Learning Outcomes – AILO Preliminary Round				
Students learn about	**Students should be able to:**	**JC Coding**	**JC Maths**	**PISA Competencies 2012 (and collaborative (2015)**
Utilising strategies effectively	1.1 Decide which tool (such as tables and charts) to utilise to analyse data effectively in a time-limited exam.	✓	✓	Exploring and understanding (as above).

Exploring actions and alternatives	1.2 As the solution is not immediately obvious, students should be able to explore ideas and alternatives, evaluate ideas and actions and take more responsibility for their learning.		✓	Representing and formulating (as above). Planning and executing (as above). Employing logic and reasoning to arrive at the optimal solution to a problem individually. Monitoring and reflecting (as above).
Evaluation		Pre- and post- Participation Round surveys.		
Assessment		Assessment of problem-solving ability: Introduction of marks for gathering, interpreting and representing data and expressing ideas clearly and accurately. Progression to and performance in the National Final.		

Goals - AILO National Final				
Students Improve confidence in their problem-solving ability. Improved problem-solving ability. Improved team-working skills in the team round. Improved student views on whether they have effective strategies for solving complex problems.	**Teachers** Teachers receive follow-up problem-solving materials for qualifiers and non-qualifiers.	**ADAPT** Direct correlation between workshop attendance and performance in the National Final. Increased interest of students to undertake ADAPT-relevant STEM topics at University. 15 ADAPT members set up and run the ADAPT AILO Final.		
Expected Learning Outcomes – AILO National Final				
Students learn about	**Students should be able to:**	**JC Coding**	**JC Maths**	**PISA Competencies 2012 (and collaborative (2015)**
Utilising strategies effectively Exploring actions and alternatives Expressing ideas clearly and accurately	1.1 Students can decide which tool (such as tables and charts) to utilise to analyse data effectively in a time-limited exam. 1.2 As the solution is not immediately obvious, students should be able to explore ideas and alternatives, evaluate	✓	✓ ✓	Exploring and understanding (as above). Representing and formulating (as above). Planning and executing (as above).

	ideas and actions and take more responsibility for their learning. 1.3 Students can explain their thinking and justify their reasoning, writing concise and complete rules to explain their answers 1.4 Follow the rules they have written to answer the questions and check for completeness.	 ✓	✓ ✓ ✓	Employing logic and reasoning and (where relevant) working collaboratively to arrive at the optimal solution to a problem. Monitoring and reflecting (as above).
Evaluation	Pre- and post- National Final surveys.			
Assessment	Asses problem-solving performance in the National Final. Assessment of rules and observations are 33% of marks on top of correct answers.			

Goals - IOL Level				
Students Students reach international standard via the ADAPT online training programme and on-site training.	**Teachers** Teachers receive follow-up problem-solving materials non-qualifiers. Teachers and schools receive all IOL-level workshop materials.	**ADAPT** Direct correlation between workshop attendance and IOL team spots. Increased interest of students to undertake ADAPT-relevant STEM topics at University Public awareness of ADAPT, AILO our identification of creative problem-solving as a key skillset to leverage digital media innovations.		
Expected Learning Outcomes – IOL Level				
Students learn about	**Students should be able to:**	**JC Coding**	**JC Maths**	**PISA Competencies 2012 (and collaborative (2015)**
IOL problem types and recognising features Working as a team Utilising strategies effectively Exploring actions and alternatives Expressing ideas clearly and accurately	1.1 Recognise each IOL-level puzzle and which features to look for in each puzzle. 1.2 Decide which strategy to utilise to analyse data effectively in a time-limited exam. 1.3 Explore ideas and alternatives, evaluate ideas and actions and take more responsibility for their learning. 1.4 Write concise and complete rules to explain their answers.	 ✓ ✓	 ✓ ✓ ✓	Exploring and understanding (as above). Representing and formulating (as above). Planning and executing (as above). Employing logic and reasoning and (where relevant) working collaboratively to arrive at the optimal solution to a problem.

	1.5 Follow the rules they have written to answer the questions and check for completeness. 1.6 Work effectively on a four-person team puzzle. 1.7 Reflect on their solution strategies and compare them to those of others as part of the team.		✓	Monitoring and reflecting (as above).
Evaluation	Pre- and post-IOL surveys and focus group.			
Assessment	Performance in online training papers, on-site training tasks and performance at IOL.			