Core STEM Competencies in STEM Education

Table below adapted from *Report 1 of ATS STEM Report Series: STEM Education in Schools: What Can We Learn from the Research?* (2020, McLoughlin et al).

Core STEM Competences	Specific Skills and Competences		
What must I learn?	*What am I doing?*		
Problem-Solving	• Problem-solving • Decision-making • Inquiry • Complex problem solving • Algorithmic problem solving	• Non-routine problem solving • Creative problem-solving skills • Making judgements • Research • Inference making	• Hypotheses making • Seeking evidence • Dealing with information • Asking questions and gathering information to solve problems
Innovation and Creativity	• Innovation (innovative thinking) • Taking an initiative	• Coming up with new ideas • Entrepreneurship	• Making an invention • Creativity
Communication	• Communication	• Presenting	
Critical Thinking	• Reflective thinking skills • Critical Thinking • High order thinking skills • Logical thinking	• Reasoning • Critical reasoning • Logical reasoning • Associative thinking	• Convergent thinking • Divergent thinking • Analytical thinking • Argumentation
Meta-Cognitive Skills	• Adaptability • Systems thinking	• Flexibility • Cognitive & meta-cognitive skills	• Making connections with learning experiences
Collaboration	• Collaborative skills • Teamwork • Interpersonal attributes • Leadership • Collaboration • Cooperative thinking • Team building	• Negotiation skills • Conflict resolution • Mutual respect • Ethical awareness Attentiveness • Courtesy • Personal skills	• Intrapersonal traits • Talking to others • Listening to others • Working with others • Social and cultural skills • Being sensitive to others' feelings
Self-Regulation	• Responsibility • Self-management • Being on time • Self-control • Self-development • Self-confidence • Self-discipline • Appropriate attitude towards work	• Dependability • Trustworthiness • Motivation • Perseverance • Positive attitude • Autonomous learning • Working on their own • Integrity	• Sustainability and Social commitment • Career and life skills • Not giving up on a task that is too hard to finish • Persistence • Always doing what you said you were going to do
Disciplinary Competences	• Theoretical learning • Practical skills • Engineering skills • Engineering design skills • Mathematical (thinking) skills • Disciplinary Competences • Numeracy skills • Solving math problems • Scientific skills	• Testing ideas about science • Conducting science labs/ experiments • Computer skills • Computing (computational) skills • Information literacy • Technology literacy	• Technological skills • Digital literacy (e.g. writing code/analysing data) • Digital technology skills • Programming skills • Express themselves using the technological tool