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Ministry of Education and Higher Education
State of Qatar • دولـــة قطـــر

QATAR SCIENCE & TECHNOLOGY SECONDARY SCHOOL FOR BOYS

Teaching, Learning, and STEM Pedagogy

Policy and Guidelines

September 2024

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Preface

Policy title	QSTSS Teaching, Learning, and STEM Pedagogy Policy and Guidelines
Version	Approved version 4 – September 2024
Supersedes	V.3 Teaching and Learning Policy - 2022/2023 and related internal guidance
Owner	QSTSS School Leadership / Academic Affairs
Approval authority	School Leadership and any MOEHE authority as applicable
Review cycle	Biennial or earlier if MOEHE expectations, curriculum requirements, technology use, or school priorities change
Applies to	All teaching staff, academic leaders, support staff directly involved in learning, and all school-organized learning settings
Related references	QSTSS Curriculum Framework, student assessment policy, safeguarding requirements, digital learning guidance, laboratory and workshop safety procedures, and any current MOEHE requirements

Implementation notes

- This document should be read together with all current MOEHE regulations, QSTSS curriculum and assessment documents, safeguarding expectations, digital learning expectations, and any other approved school procedures.
- Where any conflict arises, the prevailing law, MOEHE requirement, official ministry circular, or approved school policy takes precedence.
- This edition is intentionally both a policy and a practical guidance manual so that it can support leadership, teachers, coordinators, lesson design, professional development, and monitoring.

Key enrichments in this edition

- Expands the teaching and learning policy into a richer STEM-focused guidance manual, not only a short policy statement.
- Provides dedicated guidance for inquiry-based learning, problem-based learning, project-based learning, engineering and design processes, and research-led learning.
- Strengthens technology integration through practical guidance on blended learning, simulations, data tools, coding, responsible AI use, and the SAMR model.

- Adds clearer expectations for values, ethics, sustainability, and integration of the Sustainable Development Goals within STEM learning.
- Includes a more detailed differentiation and inclusion toolkit covering planning, grouping, scaffolding, challenge, intervention, and stretch for high-attaining learners.
- Draws on the uploaded pedagogy tips, teaching and learning evaluation standards, and teaching-domain criteria to make the policy directly usable in classrooms and learning reviews.

QSTSS's Vision, Mission, Values

1. Purpose and policy statement

At QSTSS, teaching and learning are the core of the school's work. This policy sets out the expectations that govern curriculum delivery, pedagogy, assessment, inclusion, intervention, use of technology, and the monitoring of quality across all learning settings. It is intended to support a common language of effective practice while still allowing subject-appropriate professional judgment.

Because QSTSS is a STEM-focused school, this document goes beyond generic classroom expectations. It provides a coherent framework for how students should experience inquiry, design, problem solving, experimentation, communication, innovation, ethical reasoning, and applied learning in authentic contexts.

This edition is intentionally written as both a policy and a guidance manual. It therefore combines formal expectations, practical descriptions of effective pedagogy, implementation prompts, and examples that can support teachers, coordinators, instructional leaders, and professional learning processes.

2. Scope

This policy applies to all teachers, coordinators, heads of department, academic leaders, counsellors, advisors, learning support personnel, laboratory and workshop staff, and any other adults directly involved in planning, facilitating, supporting, or monitoring student learning at QSTSS.

The policy applies to classroom teaching, practical laboratory work, workshops, STEM projects, research tasks, field-based learning, enrichment, intervention, online and blended learning, competitions, and any other school-organised learning experience.

Relevant sections of the document also inform expectations for students and parents, especially in relation to engagement, academic honesty, digital conduct, home learning, feedback, and support for learning.

3. Strategic alignment and QSTSS identity

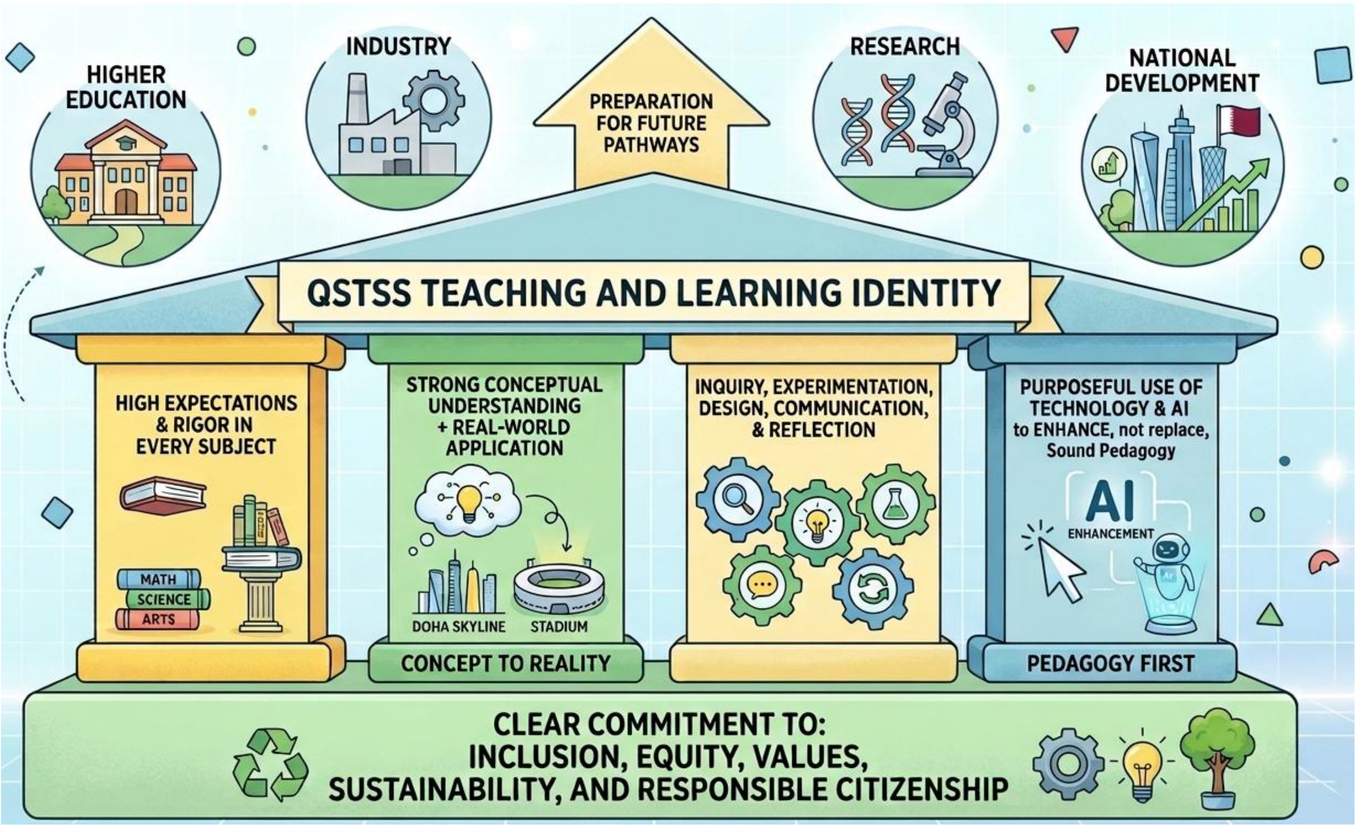
This policy operationalises the QSTSS vision, mission, values, learner profile, curriculum framework, and wider school improvement priorities. It also aligns with national expectations and current MOEHE requirements as applicable.

Teaching and learning at QSTSS are expected to reflect the school's identity as a STEM-focused school that prepares students for advanced study, innovation, responsible citizenship, and meaningful contribution to a knowledge-based economy.

In practical terms, this means that students should not only recall subject content. They should increasingly learn to inquire, reason with evidence, interpret data, model ideas, solve unfamiliar problems, communicate findings, collaborate productively, and act with ethical and social responsibility.

QSTSS teaching and learning identity

- High expectations and rigor in every subject.
- Strong conceptual understanding combined with real-world application.
- Inquiry, experimentation, design, communication, and reflection as normal features of learning.
- Purposeful use of technology and AI to enhance, not replace, sound pedagogy.
- Clear commitment to inclusion, equity, values, sustainability, and responsible citizenship.
- Preparation for future pathways in higher education, industry, research, and national development.



4. Guiding principles for teaching and learning at QSTSS

4.1 Ambition, quality, and rigor

Learning should be intellectually demanding, carefully sequenced, and aligned with approved standards and intended outcomes. Students should be challenged to think deeply, apply ideas accurately, and produce work of quality.

4.2 Inquiry, discovery, design, and communication

Students should be given structured opportunities to ask questions, investigate ideas, test possibilities, design solutions, explain reasoning, and communicate their understanding clearly using appropriate evidence and disciplinary language.

4.3 Real-world relevance and authenticity

Learning should connect to meaningful contexts, local and global issues, sustainability themes, community realities, and future career pathways so that students understand why the learning matters.

4.4 Inclusion, access, and challenge for all

All students should have equitable access to high-quality learning and appropriately challenging work. Differentiation should increase access, support, and stretch without lowering the quality of learning.

4.5 Student agency and responsibility

Students should increasingly understand learning goals, success criteria, quality expectations, and how to act on feedback. Voice, choice, reflection, and ownership are important features of a mature learning culture.

4.6 Relationships, wellbeing, and belonging

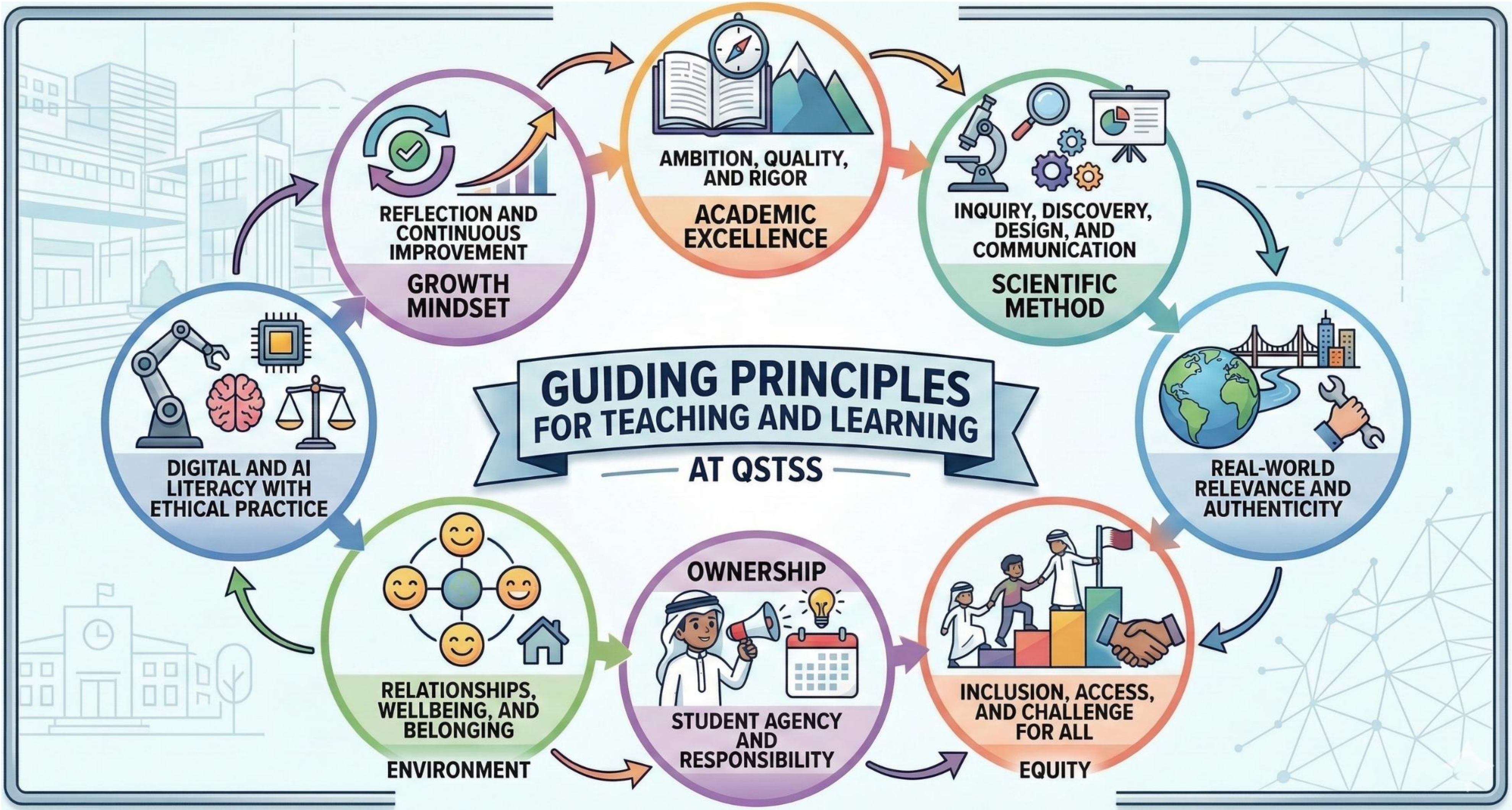
Positive relationships, psychological safety, fairness, consistency, and respect are essential conditions for strong learning. Students should feel known, supported, and able to contribute.

4.7 Digital and AI literacy with ethical practice

Technology and AI should be used purposefully, critically, safely, and ethically. Students should learn to evaluate digital information, protect privacy, act honestly, and understand the limits as well as the possibilities of AI-supported learning.

4.8 Reflection and continuous improvement

Effective teaching is evidence-informed and adaptive. Planning, observation, dialogue, moderation, data review, student feedback, and professional learning should all contribute to continuous refinement of practice.


GUIDING PRINCIPLES
FOR TEACHING AND LEARNING
AT QSTSS
AMBITION, QUALITY, AND RIGOR
ACADEMIC EXCELLENCE
INQUIRY, DISCOVERY, DESIGN, AND COMMUNICATION
SCIENTIFIC METHOD
REAL-WORLD RELEVANCE AND AUTHENTICITY
INCLUSION, ACCESS, AND CHALLENGE FOR ALL
EQUITY
OWNERSHIP
STUDENT AGENCY AND RESPONSIBILITY
RELATIONSHIPS, WELLBEING, AND BELONGING
ENVIRONMENT
DIGITAL AND AI LITERACY WITH ETHICAL PRACTICE
REFLECTION AND CONTINUOUS IMPROVEMENT
GROWTH MINDSET

5. The QSTSS model of high-quality teaching and learning

The QSTSS teaching and learning model provides a shared framework for effective practice. It is not a rigid script or a single lesson format. It is a coherent set of features that should be visible, over time, across subjects and year groups.

Core component	What it means in practice at QSTSS
Learning purpose	Teachers make the intended learning visible, connect it to prior knowledge, and communicate why it matters.
Challenge and access	Tasks are intellectually worthwhile, but also scaffolded so that all students can engage, think, and make progress.
Active thinking	Students do not only listen; they discuss, investigate, model, solve, create, analyse, test, and explain.
STEM connection	Where appropriate, learning links to real systems, phenomena, data, engineering applications, technology, sustainability, or interdisciplinary contexts.
Assessment for learning	Teachers gather evidence continuously through questioning, observation, discussion, short tasks, practical performance, and review of student work.
Feedback and reflection	Students receive timely guidance and are expected to improve their thinking and products accordingly.
Culture and relationships	Classrooms are safe, respectful, well organised, and characterised by high expectations, belonging, and responsibility.
Technology and tools	Digital resources, simulations, coding tools, collaboration platforms, sensors, spreadsheets, and AI are selected when they clearly improve the learning.
Continuous improvement	Teachers use evidence, review, and collaboration to refine teaching over time.

6. Curriculum delivery and planning expectations

Curriculum implementation at QSTSS should be coherent across long-term, medium-term, and short-term planning. Planning should support careful consideration of progression, sequencing, challenge, assessment, differentiation, interdisciplinary connection, and resource use, without becoming an exercise in unnecessary paperwork. It should enable teachers to deliver learning that is purposeful, appropriately challenging, and aligned with curriculum expectations and the broader aims of QSTSS as a STEM-focused school.

6.1 Long-term and medium-term planning

- Department and subject plans should align with approved curriculum requirements, the QSTSS Curriculum Framework, and the intended knowledge, skills, values, and competencies of the subject or program.
- Units and learning sequences should be planned in a logical order so that foundational knowledge and skills support later conceptual understanding, application, problem solving, and increasing independence.
- Where appropriate, planning should identify opportunities for STEM integration, practical inquiry, design work, research, literacy and numeracy development, sustainability themes, and meaningful interdisciplinary connections.

- Medium-term planning should make clear the intended learning focus, key content, expected progression, major assessment opportunities, and any significant resource, safety, or practical requirements.
- Assessment planning should indicate how learning will be monitored formatively and how achievement will be evaluated more formally over time.

6.2 Lesson and sequence planning

- Teachers should plan lessons and learning sequences with clear, manageable objectives that are aligned with intended learning, suitable activities, and appropriate assessment opportunities.
- Planning should show a clear connection between what students are expected to learn, the learning experiences provided, the resources required, and the evidence that will be used to check whether learning is taking place.
- Lesson and sequence plans should be realistic in scope and timing, with activities and expectations that can be completed effectively within the available time.
- Teachers should plan with sufficient clarity to support effective delivery, smooth lesson flow, and appropriate adaptation where needed in response to student understanding.
- Teachers are expected to use the approved QSTSS lesson planning template, or another officially approved planning format, to support consistency and quality in planning.

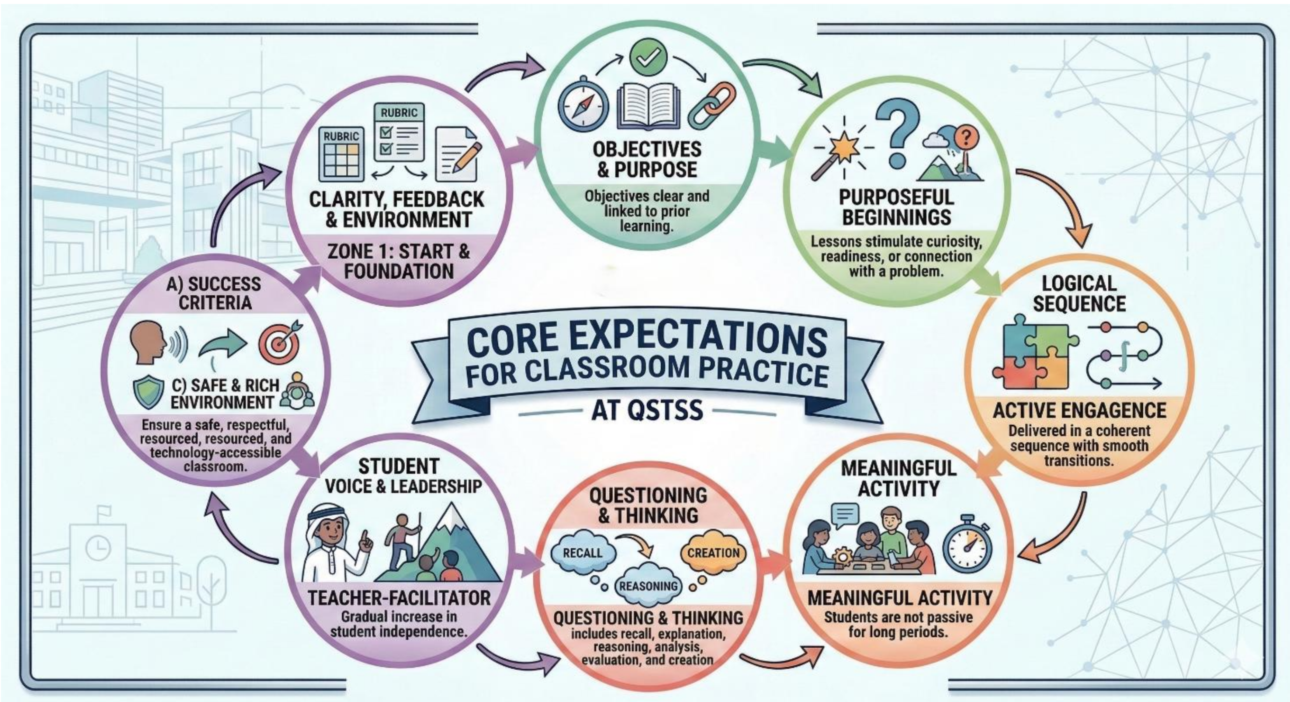
6.3 Responsive planning and professional judgement

- Planning should be informed by curriculum expectations, prior learning, assessment evidence, and teachers' knowledge of students' needs, strengths, and next steps.
- Teachers should review the impact of lessons and sequences and use this reflection to adapt to future planning where needed.
- Planning should therefore be understood as a practical and responsive professional process that supports high-quality teaching and improved student learning, rather than as a compliance exercise alone.

7. Core expectations for classroom practice

The teaching-domain attachment and evaluation guidance highlight several recurring features of effective teaching. These expectations should inform everyday classroom practice at QSTSS.

- Objectives and purpose are made clear and linked to prior learning.
- Lessons begin in a purposeful way that stimulates curiosity, readiness, or connection with a real problem, phenomenon, question, or application.
- Learning is delivered in a logical, coherent sequence with smooth transitions and a clear thread of meaning.
- Students engage in meaningful activity and are not passive for long periods.
- Questioning includes recall, explanation, reasoning, analysis, evaluation, and creation as appropriate.
- The teacher functions as both expert guide and facilitator, gradually increasing student independence.
- Student voice, choice, collaboration, and leadership are built in where appropriate.
- Success criteria, exemplars, rubrics, or quality indicators are used when they help students understand what good work looks like.
- Feedback is timely, specific, and used to address misconceptions and improve work.
- The classroom is safe, respectful, organized, and rich in purposeful resources and accessible technology.



8. STEM pedagogy framework

STEM pedagogy at QSTSS is not a single method. It is a set of educational approaches that help learners build disciplinary knowledge and use that knowledge to investigate, design, solve, test, communicate, and improve. Teachers should choose the approach that best fits the learning goal rather than forcing every lesson into the same format.

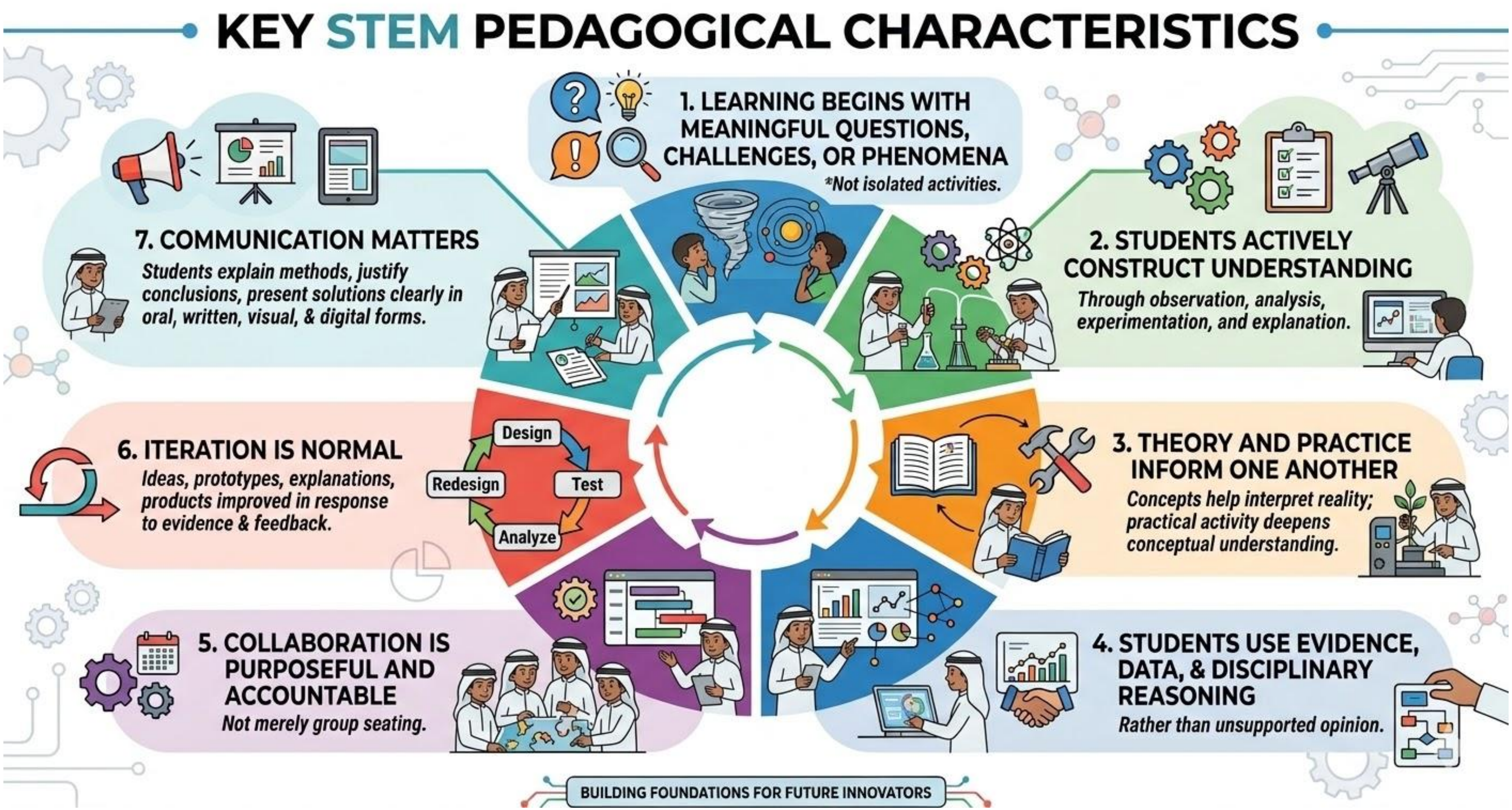
Across the curriculum, strong STEM pedagogy typically includes a combination of the following features: meaningful questions, authentic problems, modelling, experimentation, design constraints, data collection, analysis, critique, iteration, communication, and reflection.

8.1 Key STEM pedagogical characteristics

- Learning begins with a meaningful question, challenge, or phenomenon rather than isolated activity.
- Students actively construct understanding through observation, analysis, experimentation, and explanation.
- Theory and practice inform one another: concepts help students interpret reality, and practical activity deepens conceptual understanding.
- Students use evidence, data, and disciplinary reasoning rather than unsupported opinion.
- Collaboration is purposeful and accountable, not merely group seating.
- Iteration is normal: ideas, prototypes, explanations, and products are improved in response to evidence and feedback.
- Communication matters: students should explain methods, justify conclusions, and present solutions clearly in oral, written, visual, and digital forms.

Approach	Main purpose	Most suitable when	Typical student outputs
Inquiry-based learning	Investigate questions, phenomena, systems, or evidence to develop understanding	Students need to explore, test, observe, explain, or reason from evidence	Explanations, lab notes, data tables, models, arguments, research summaries
Problem-based learning	Use knowledge and inquiry to address an open-ended problem	Students need to diagnose, analyse, and propose justified responses to a complex issue	Solutions, recommendations, briefings, decision matrices, presentations

Approach	Main purpose	Most suitable when	Typical student outputs
Project-based learning	Sustain learning over time through a meaningful product or performance	Students need to integrate several outcomes into a longer sequence with planning and production	Prototypes, reports, campaigns, exhibitions, portfolios, public presentations
Design / engineering process	Create, test, and improve a design under criteria and constraints	The learning requires invention, prototyping, optimisation, or practical problem solving	Design sketches, prototypes, test results, iterations, design justifications
Research cycle	Collect, interpret, and communicate knowledge systematically	Students need to investigate a topic, review evidence, or conduct structured inquiry	Research questions, literature notes, methods, findings, posters, research papers


KEY STEM PEDAGOGICAL CHARACTERISTICS
1. LEARNING BEGINS WITH MEANINGFUL QUESTIONS, CHALLENGES, OR PHENOMENA
*Not isolated activities.
2. STUDENTS ACTIVELY CONSTRUCT UNDERSTANDING
Through observation, analysis, experimentation, and explanation.
3. THEORY AND PRACTICE INFORM ONE ANOTHER
Concepts help interpret reality; practical activity deepens conceptual understanding.
4. STUDENTS USE EVIDENCE, DATA, & DISCIPLINARY REASONING
Rather than unsupported opinion.
5. COLLABORATION IS PURPOSEFUL AND ACCOUNTABLE
Not merely group seating.
6. ITERATION IS NORMAL
Ideas, prototypes, explanations, products improved in response to evidence & feedback.
Design
Test
Analyze
Redesign
7. COMMUNICATION MATTERS
Students explain methods, justify conclusions, present solutions clearly in oral, written, visual, & digital forms.
BUILDING FOUNDATIONS FOR FUTURE INNOVATORS

9. Inquiry-based learning guidance

Inquiry-based learning is central to STEM education because it helps students move beyond recall and into disciplined curiosity. In inquiry, students ask questions, observe carefully, investigate, interpret evidence, construct explanations, and refine their thinking.

9.1 What effective inquiry looks like

- The inquiry starts with a meaningful phenomenon, question, discrepancy, data set, text, design need, or practical observation.
- Students are guided to notice, wonder, predict, test, compare, classify, analyze, or explain.
- Teacher guidance is deliberate. Inquiry does not mean leaving students without structure; it means using structured exploration and guided thinking to build understanding.
- Students are expected to support claims with evidence and reasoning.
- Questioning and dialogue move students from observation to interpretation, from interpretation to explanation, and from explanation to critique and refinement.
- The inquiry ends with some form of communication, conclusion, reflection, or application.

9.2 Teacher moves in inquiry-based learning

- Frame a strong driving question or a puzzling starting point.
- Elicit prior knowledge and common misconceptions early.
- Model how to observe carefully, record evidence, and think aloud through reasoning steps.
- Use prompts such as 'What do you notice?', 'What patterns do you see?', 'What evidence supports that?', and 'What could explain this result?'
- Provide sufficient structure through graphic organizers, data tables, checklists, sentence stems, or staged questions.
- Use closure that helps students synthesize the core idea of the lesson. The pedagogy tips attachment usefully recommends keeping the core idea visible and revisiting it at the end through a mind map or organizer.

9.3 Useful inquiry cycles

- 5E model: Engage, Explore, Explain, Elaborate, Evaluate.
- POE model: Predict, Observe, Explain (and adapt for design where appropriate).
- Research cycle: Ask, plan, gather, analyze, interpret, communicate, reflect.
- Engineering inquiry: Define, imagine, plan, create, test, improve, communicate.

10. Problem-based learning guidance

Problem-based learning develops students' ability to reason through complex, often messy, real-world situations. Students work with a problem that does not have one obvious path to a solution and must identify what they know, what they need to know, and how to move forward.

10.1 Features of high-quality problem-based learning

- Problems are authentic, open-ended, and worth solving.
- Students must analyze information, identify assumptions, define the problem more precisely, and evaluate options.
- Content knowledge is not abandoned. Students must use subject knowledge to understand and address the problem.
- There is a clear expectation for evidence-based justification, not only opinion.
- Students may work in teams, but individual accountability remains visible.
- The process includes reflection on both the solution and the reasoning used.

10.2 Good uses of problem-based learning at QSTSS

- Analyzing an environmental challenge linked to water, energy, waste, biodiversity, or urban design in Qatar.
- Investigating a health, engineering, or technology problem that requires data interpretation and evidence-based recommendation.
- Using case studies in science, mathematics, computing, design technology, entrepreneurship, or research modules.
- Connecting SDGs, ethics, and local relevance through structured decision-making tasks.

10.3 Teacher guidance in problem-based learning

- Clarify the problem statement, desired output, time frame, and quality criteria.
- Support students in separating facts, assumptions, constraints, and unknowns.
- Teach students how to gather and evaluate information sources rather than merely search online.
- Require students to compare options, weigh criteria, justify decisions, and anticipate limitations or trade-offs.
- Use checkpoints so that teams do not drift into activity without intellectual depth.

11. Project-based learning guidance

Project-based learning is especially powerful in a STEM school when it is academically rigorous, purposeful, and well managed. A project is not simply any extended task. It should sustain learning over time through a meaningful question, challenge, or product, and should require students to apply important knowledge and skills.

11.1 Core design features of strong projects

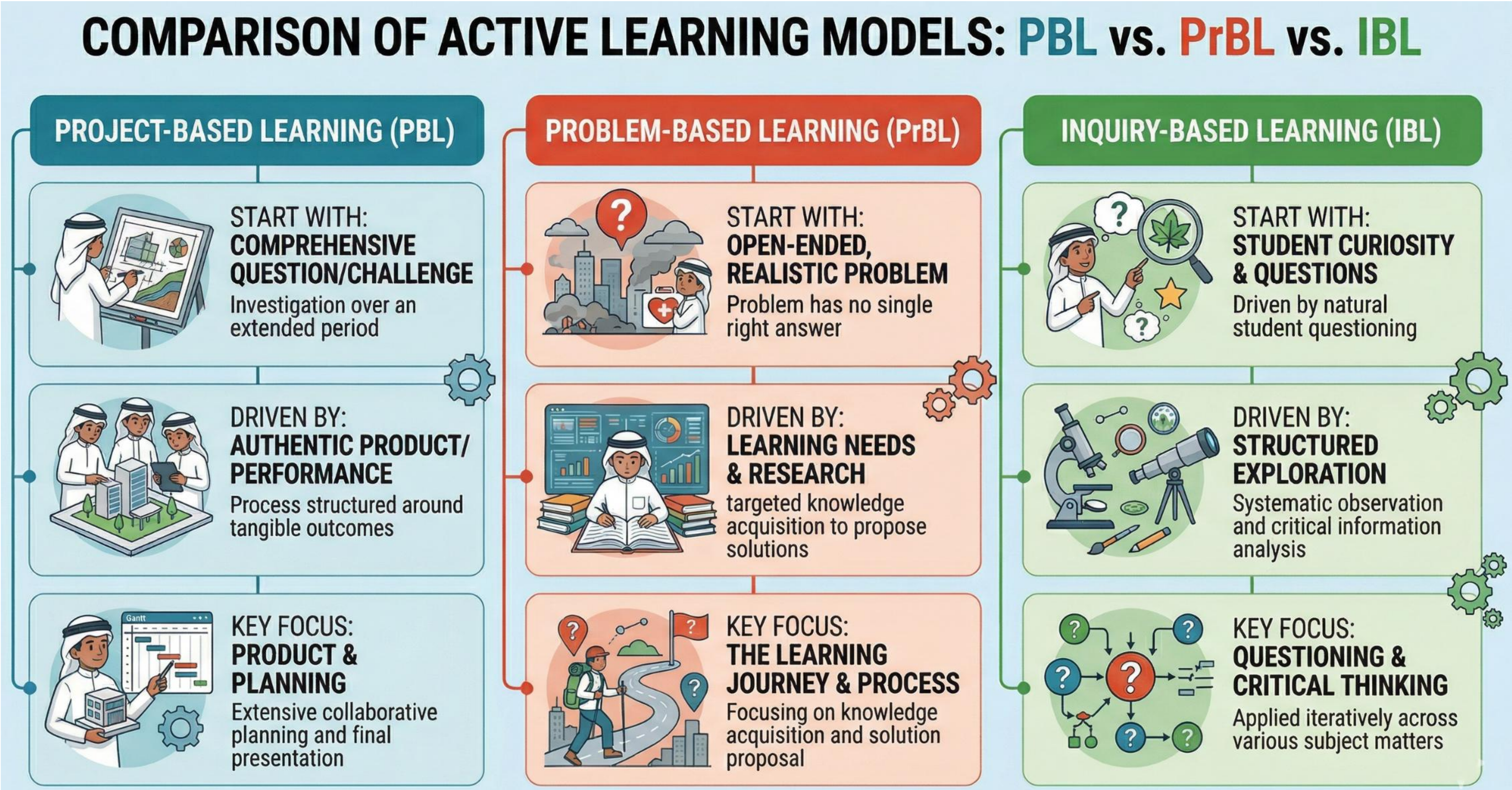
- A driving question, design brief, or challenge that gives coherence to the work.
- Clearly identified subject outcomes and standards so that academic learning remains central.
- A sequence of milestones, checkpoints, and mini-deadlines rather than an unstructured long task.
- Research, making, testing, critique, and revision built into the project process.
- Public product, presentation, exhibition, demonstration, or authentic audience where appropriate.
- Reflection on what was learned, how it was learned, and what could be improved.

11.2 Common pitfalls to avoid

- Projects that are visually appealing but intellectually shallow.
- Group work without clear roles, accountability, or evidence of individual learning.
- Too many materials, tasks, or side activities that distract from the main learning goals.
- Assessment that focuses only on the final product and ignores process, understanding, and reasoning.
- Projects launched without sufficient modelling, scaffolding, or exemplars.

11.3 Project planning expectations

- Identify the key knowledge and skills that students must learn and demonstrate.
- Provide rubrics, quality indicators, or exemplars where useful.
- Plan explicit teaching moments within the project sequence rather than expecting students to discover everything independently.
- Build in structured critique, peer feedback, and revision points.
- Use documentation such as logs, design notebooks, progress trackers, or process portfolios to make learning visible.



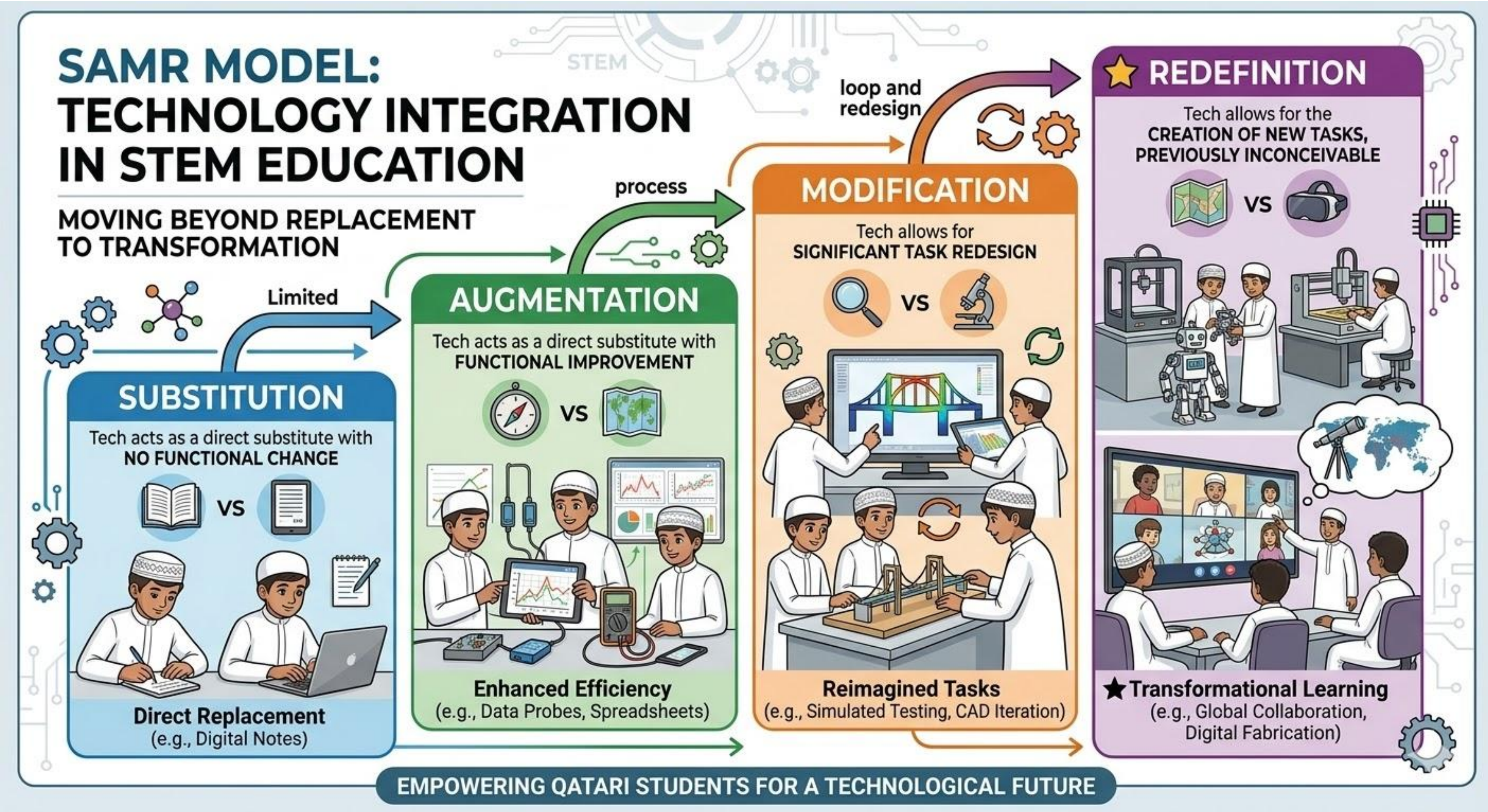
COMPARISON OF ACTIVE LEARNING MODELS: PBL vs. PrBL vs. IBL
PROJECT-BASED LEARNING (PBL)
START WITH: COMPREHENSIVE QUESTION/CHALLENGE
Investigation over an extended period
DRIVEN BY: AUTHENTIC PRODUCT/ PERFORMANCE
Process structured around tangible outcomes
KEY FOCUS: PRODUCT & PLANNING
Extensive collaborative planning and final presentation
Gantt
PROBLEM-BASED LEARNING (PrBL)
START WITH: OPEN-ENDED, REALISTIC PROBLEM
Problem has no single right answer
DRIVEN BY: LEARNING NEEDS & RESEARCH
targeted knowledge acquisition to propose solutions
KEY FOCUS: THE LEARNING JOURNEY & PROCESS
Focusing on knowledge acquisition and solution proposal
INQUIRY-BASED LEARNING (IBL)
START WITH: STUDENT CURIOSITY & QUESTIONS
Driven by natural student questioning
DRIVEN BY: STRUCTURED EXPLORATION
Systematic observation and critical information analysis
KEY FOCUS: QUESTIONING & CRITICAL THINKING
Applied iteratively across various subject matters

12. Technology integration, digital learning, and the SAMR model

Technology should be used at QSTSS to enhance learning, not to replace sound pedagogy. Digital tools should support clarity, modelling, access, data analysis, simulation, coding, communication, collaboration, feedback, and creativity where they genuinely improve the learning experience.

The earlier QSTSS policy referred to the SAMR model, and this remains a useful framework for thinking about the depth of technology integration. However, SAMR should not be used as a simplistic checklist. Not every lesson must aim for the highest level. The right level depends on the learning goal.

SAMR level	Core idea	What it means in practice	Example in a STEM-focused school
Substitution	Technology acts as a direct substitute with no major functional change	Useful for efficiency, access, readability, distribution, or basic completion of work	Students complete a lab worksheet digitally instead of on paper.
Augmentation	Technology substitutes but offers functional improvement	Adds features such as auto-feedback, accessibility supports, embedded media, or easier organisation	Students complete a quiz with instant feedback or annotate a scientific diagram using a digital platform.
Modification	Technology allows significant task redesign	The task changes meaningfully because students can collaborate, simulate, visualise, collect, or analyse in new ways	Students use a simulation and spreadsheet to test variables, graph patterns, and compare results collaboratively.
Redefinition	Technology enables new tasks that were previously difficult or impossible	Students create, communicate, investigate, or connect in ways not possible through traditional methods alone	Students collect sensor data, code a model, generate a dashboard, consult external experts online, and publish findings through multimedia presentation.



SAMR MODEL:
TECHNOLOGY INTEGRATION IN STEM EDUCATION
MOVING BEYOND REPLACEMENT TO TRANSFORMATION
STEM
Limited
process
loop and redesign
SUBSTITUTION
Tech acts as a direct substitute with NO FUNCTIONAL CHANGE
VS
Direct Replacement
(e.g., Digital Notes)
AUGMENTATION
Tech acts as a direct substitute with FUNCTIONAL IMPROVEMENT
VS
Enhanced Efficiency
(e.g., Data Probes, Spreadsheets)
MODIFICATION
Tech allows for SIGNIFICANT TASK REDESIGN
VS
Reimagined Tasks
(e.g., Simulated Testing, CAD Iteration)
REDEFINITION
Tech allows for the CREATION OF NEW TASKS, PREVIOUSLY INCONCEIVABLE
VS
Transformational Learning
(e.g., Global Collaboration, Digital Fabrication)
EMPOWERING QATARI STUDENTS FOR A TECHNOLOGICAL FUTURE

12.1 Principles for technology integration at QSTSS

- Begin with the learning objective, then choose the tool.
- Use digital tools that are age-appropriate, accessible, secure, and approved for school use.
- Select tools that improve explanation, visualization, research, creation, collaboration, feedback, or independence rather than adding unnecessary complexity.
- Use simulations, videos, animations, visualizers, sensors, spreadsheets, coding platforms, and modelling tools when they deepen conceptual understanding or practical inquiry.
- Support students in evaluating digital information, citing sources, protecting privacy, and acting with academic honesty.
- Technology integration should remain inclusive. Teachers should consider access, pacing, usability, and support for students with differing needs.

12.2 Practical technology guidance drawn from the uploaded pedagogy tips

- Use videos, animations, and simulations purposefully, not passively. Before viewing, tell students what to look for and ask a question they must answer while watching.
- Where suitable, mute the original sound and narrate using your own subject language to focus attention on the key concept.
- Share selected digital resources with students for review beyond lesson time so that class time can be used more actively.
- Use digital tools to **make learning visible**: display objectives, core ideas, models, graphs, simulations, and worked examples clearly.
- In practical STEM contexts, integrate digital tools into inquiry and data analysis, including simulations, coding, spreadsheets, graphing, or computational methods where appropriate.

13. Responsible and productive use of AI

AI tools may support learning, teaching, planning, translation, coding assistance, feedback, brainstorming, modelling, and administrative efficiency when used carefully. At the same time, AI must not weaken thinking, originality, validity of assessment, or academic honesty.

13.1 Expectations for teachers

- Use AI as a support tool, not as a replacement for professional judgment or subject expertise.
- Check outputs critically for accuracy, bias, omissions, inappropriate simplification, and invented information.

- Use AI to differentiate materials, generate question stems, suggest examples, translate where needed, refine explanations, or provide draft feedback only when the teacher remains the responsible decision-maker.
- Do not use AI in ways that violate privacy, confidentiality, copyright, or school safeguarding expectations.
- Teach students explicitly when AI use is permitted, limited, or prohibited.

13.2 Expectations for students

- Students should learn to verify AI outputs rather than accept them uncritically.
- Students should understand that AI can be inaccurate, biased, incomplete, or misleading.
- Students should not present AI-generated work as entirely their own where disclosure or independent work is required.
- Students should learn to use AI to support thinking, planning, checking, or refinement without outsourcing the intellectual core of the task.

14. Assessment for learning, feedback, and evidence of progress

Assessment at QSTSS should provide useful evidence about what students know, understand, can do, and still need to develop. Assessment is not an end in itself. It is a means of improving learning, guiding teaching, supporting intervention, and communicating progress.

14.1 Core assessment expectations

- Assessment should include an appropriate balance of diagnostic, formative, practical, performance-based, project-based, and summative approaches as required by the subject and phase.
- Teachers should check for understanding frequently through questioning, observation, short written tasks, practical demonstration, review of notebooks, discussions, retrieval practice, exit tickets, quizzes, or digital checks where appropriate.
- Success criteria, rubrics, mark schemes, and exemplars should be used when they improve clarity and consistency.
- Feedback should be timely, specific, and manageable, and should help students know what to improve and how to improve it.
- Students should be expected to respond to feedback and use it to refine their work, methods, or understanding.

14.2 Practical feedback guidance

- Go around while students work and use live feedback to identify misconceptions early.
- Provide feedback on oral and written responses, not only on final submissions.

- Use whole-class feedback, model answers, and exemplification when these are more efficient and equally effective.
- Encourage self-assessment and peer assessment when students have enough clarity about the quality criteria.

14.3 Assessment evidence and data use

- Assessment records should be proportionate and purposeful rather than burdensome.
- Teachers and leaders should use evidence to identify trends, misconceptions, learning gaps, underachievement, and priorities for reteaching, intervention, support, or extension.
- Reporting to students and parents should be accurate, timely, and aligned with the school assessment policy.

15. Differentiation, inclusion, intervention, and stretch

QSTSS is committed to ensuring that all students can access high-quality learning and make strong progress. Meeting individual needs does not mean reducing ambition. It means using thoughtful adjustments, supports, and extensions so that every student can participate meaningfully and demonstrate growth.

15.1 Principles of differentiation

- Differentiate to increase access and challenge, not to create lower-quality learning for some students.
- Differentiate responsively, based on readiness, prior knowledge, language needs, interests, misconceptions, confidence, and pace.
- Use a blend of whole-class instruction, structured modelling, guided practice, independent practice, collaboration, and targeted support.
- Support should be temporary where possible and should build greater independence over time.
- High-attaining students should receive deeper challenge, greater complexity, or broader transfer, not merely more of the same work.

15.2 Practical differentiation techniques

Dimension	Examples of effective practice at QSTSS
Content	Provide pre-teaching of vocabulary, accessible texts, visual summaries, concrete models, worked examples, and curated resource levels while keeping the core learning intention aligned.
Process	Use guided questions, step-by-step prompts, think-pair-share, chunked instructions, flexible grouping, scaffolded investigations, and staged research tasks.

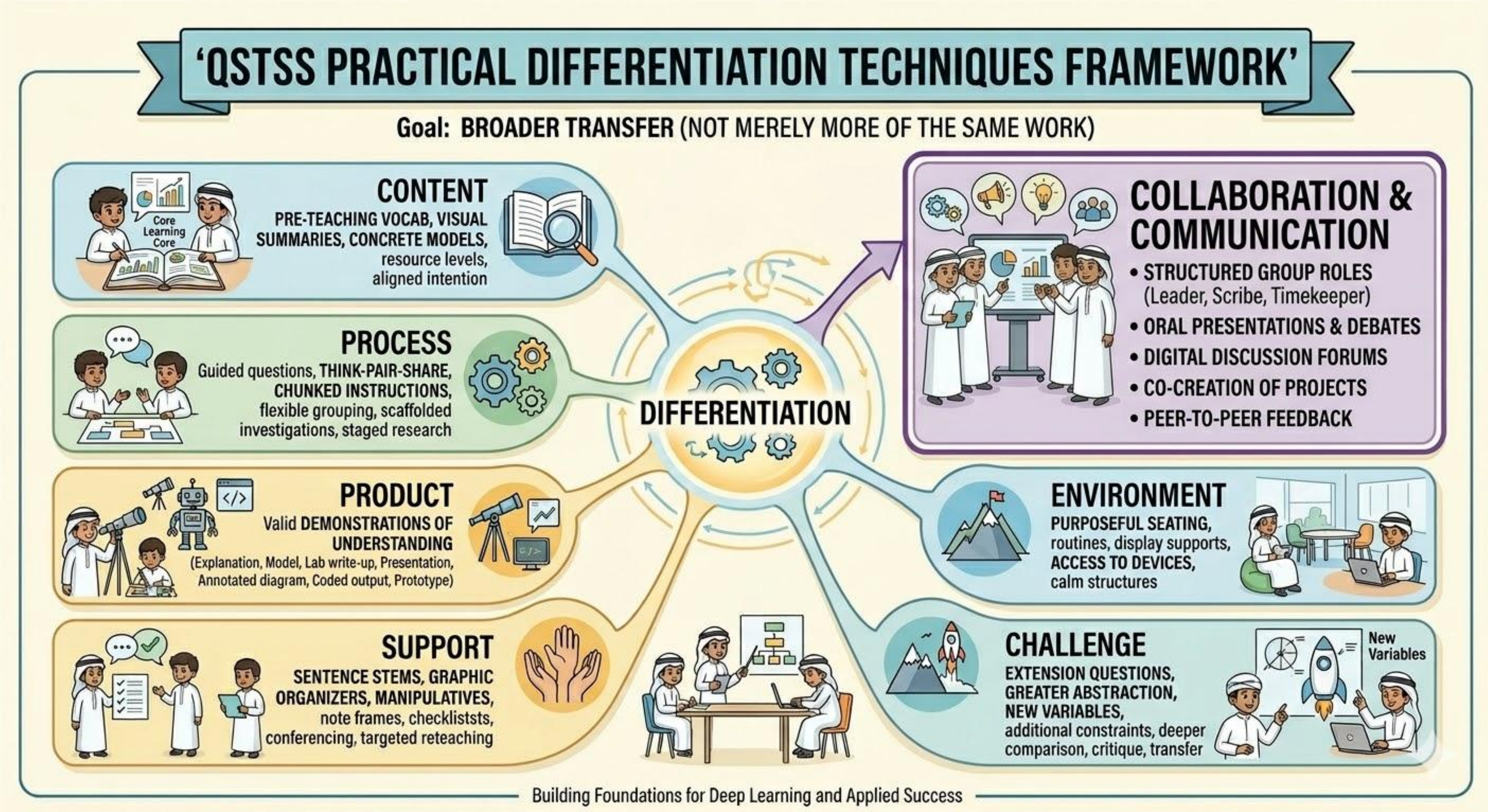
Dimension	Examples of effective practice at QSTSS
Product	Allow students to demonstrate understanding through different products were valid, such as explanation, model, lab write-up, presentation, annotated diagram, coded output, or prototype.
Support	Use sentence stems, graphic organisers, manipulatives, note frames, checklists, conferencing, peer support, teacher station support, and targeted reteaching.
Challenge	Offer extension questions, greater abstraction, new variables, additional constraints, deeper comparison, critique of methods, and transfer to unfamiliar contexts.
Environment	Use purposeful seating, routines, display supports, access to devices, assistive tools, and calm structures that maximise participation and learning time.

15.3 Useful strategies highlighted in the uploaded guidance

- Differentiate objectives, resources, and tasks where needed.
- Use a range of tangible, visual, auditory, and hands-on resources to support different learners.
- Design varied worksheets or activity levels for the main task where appropriate; the uploaded evaluation guidance even suggests a practical three-level worksheet approach in some lessons.
- Use mixed-ability groups when peer support and explanation will help, and use homogeneous groups when more targeted teacher support is needed.
- Keep assignment and investigation sheets clear, readable, and manageable, and support students in completing tables, graphs, and analysis sections where necessary.

15.4 Inclusion and intervention

- Teachers should identify students who need additional support, language support, pastoral support, or more formal intervention and work with relevant staff to plan and monitor responses.
- Where accommodation plans or agreed support exist, they should be implemented consistently.
- Intervention should be evidence-informed and should focus on specific barriers or gaps rather than generic extra work.
- Students should continue to experience belonging, dignity, and high expectations while receiving support.


'QSTSS PRACTICAL DIFFERENTIATION TECHNIQUES FRAMEWORK'
Goal: BROADER TRANSFER (NOT MERELY MORE OF THE SAME WORK)
Core Learning Core
CONTENT
PRE-TEACHING VOCAB, VISUAL SUMMARIES, CONCRETE MODELS, resource levels, aligned intention
PROCESS
Guided questions, THINK-PAIR-SHARE, CHUNKED INSTRUCTIONS, flexible grouping, scaffolded investigations, staged research
PRODUCT
Valid DEMONSTRATIONS OF UNDERSTANDING
(Explanation, Model, Lab write-up, Presentation, Annotated diagram, Coded output, Prototype)
SUPPORT
SENTENCE STEMS, GRAPHIC ORGANIZERS, MANIPULATIVES, note frames, checkliststs, conferencing, targeted reteaching
DIFFERENTIATION
COLLABORATION & COMMUNICATION
• STRUCTURED GROUP ROLES (Leader, Scribe, Timekeeper)
• ORAL PRESENTATIONS & DEBATES
• DIGITAL DISCUSSION FORUMS
• CO-CREATION OF PROJECTS
• PEER-TO-PEER FEEDBACK
ENVIRONMENT
PURPOSEFUL SEATING, routines, display supports, ACCESS TO DEVICES, calm structures
CHALLENGE
EXTENSION QUESTIONS, GREATER ABSTRACTION, NEW VARIABLES, additional constraints, deeper comparison, critique, transfer
New Variables
Building Foundations for Deep Learning and Applied Success

16. Values, ethics, citizenship, and SDG integration

A strong STEM school does not treat values and sustainability as optional extras. At QSTSS, values, ethics, and global responsibility should be integrated into learning in purposeful ways. Students should understand that scientific, technological, and engineering developments always have human, environmental, social, and ethical dimensions.

16.1 Core expectations

- Learning should create opportunities to discuss responsibility, integrity, respect, collaboration, perseverance, sustainability, and ethical use of knowledge and technology.
- Where appropriate, lessons should connect with relevant Sustainable Development Goals, especially through local and regional relevance.
- Students should be encouraged to consider impact, trade-offs, unintended consequences, and responsible decision-making when designing or evaluating solutions.
- Values and SDGs should be embedded meaningfully through content, questions, projects, practical tasks, and reflection rather than added superficially.

Area	Practical guidance for integration
SDGs in science	Connect topics to water quality, health, climate, biodiversity, energy, materials, food systems, and sustainable consumption where this is academically relevant.
SDGs in mathematics and data	Use authentic data sets related to population, energy, transport, emissions, public health, finance, or resource use to strengthen modelling and interpretation.
SDGs in computing and technology	Discuss digital inclusion, ethical AI, cybersecurity, automation, smart systems, accessibility, and responsible innovation.
SDGs in design and engineering	Build design briefs around efficiency, safety, sustainability, durability, user needs, local context, and environmental impact.
Values integration	Use routines that develop honesty, collaboration, accountability, respect for evidence, responsible debate, and care for shared resources and the environment.

17. Learning environment, climate, literacy, and student agency

High-quality learning depends on climate as much as on content. Classrooms, laboratories, and workshops should be safe, respectful, well organised, and rich in purposeful resources. Time for learning should be protected through clear routines, strong relationships, and consistent expectations.

17.1 Climate and culture

- Create an inclusive and respectful classroom where every learner feels safe, valued, and able to contribute.
- Maintain high expectations with tasks that are challenging, attainable, and supportive of growth.
- Promote student independence, self-reflection, responsibility, and ownership of learning.
- Use positive reinforcement and motivating language. The uploaded evaluation guidance also highlights the need to ensure every student is involved and not only the most confident learners.
- Build routines for behavior, learning, transitions, practical safety, and digital responsibility.

17.2 Literacy and numeracy across the curriculum

- Teachers should intentionally develop the language and numeracy demands of their subjects.
- Important vocabulary should be explained, displayed, revisited, and used accurately by students.
- Students should regularly read, interpret, discuss, calculate, estimate, graph, justify, and communicate as required by the discipline.
- Cross-curricular links should be made explicit where useful; the evaluation guidance specifically emphasizes linking to language skills, arithmetic skills, current events, environmental issues, and Qatar’s context.

17.3 Displays and making learning visible

- Displays should support learning, not merely decorating the room.
- Useful displays may include key ideas, vocabulary, worked examples, concept maps, success criteria, practical reminders, safety rules, and quality exemplars.
- The uploaded pedagogy tips emphasize writing the core idea visibly and returning to it throughout the lesson. This principle is strongly encouraged.

18. Practical STEM learning in laboratories, workshops, and applied settings

Practical and applied learning are central to QSTSS. Students should regularly experience hands-on inquiry, experimentation, measurement, fabrication, coding, testing, and evidence-based communication. However, practical activity is valuable only when it is intellectually purposeful and safely managed.

18.1 Core expectations

- Practical sessions should be prepared with clear objectives, suitable resources, explicit procedures, and visible safety reminders.
- Teachers should model and reinforce safe handling of equipment, materials, tools, and procedures throughout the activity.
- Students should collect, record, and organize qualitative and quantitative data accurately using appropriate tools and methods.
- Students should interpret results, identify limitations, and draw conclusions that are justified by evidence.
- Students should communicate findings and defend conclusions using written, oral, visual, or digital formats.

18.2 Practical guidance drawn from the uploaded pedagogy tips

- Ensure all required safety clothing and expectations are clear before activity begins; the uploaded tips specifically mention proper use of lab coats.
- Use practical work to deepen concepts, not merely entertain. Students should know what they are investigating, what data they need, and what conclusion they are trying to reach.
- Show and complete complex data tables, graphing steps, or analysis questions with students when the aim is to teach the process explicitly.
- Highlight STEM cross-links clearly. For example, a science lesson may connect to mathematics through graph interpretation and slope, and to engineering through design applications.

19. Home learning, research habits, and independent study

Home learning at QSTSS should support consolidation, retrieval, preparation, independent study, reflection, reading, design refinement, research, or extension. It should be purposeful and manageable rather than routine completion work with little learning value.

- Home learning should have a clear purpose and realistic time expectation.
- Instructions, deadlines, and success expectations should be clear.
- Where appropriate, digital platforms may be used to distribute materials, resources, and feedback efficiently.
- Students should learn habits of organization, honesty, note-taking, source evaluation, and independent review.
- Parents should support routines and accountability without doing the work for the student.

20. Roles and responsibilities

Role	Main responsibilities
School leadership	Set strategic direction; ensure coherent systems, staffing, resources, accountability, and quality assurance; support professional growth; use evidence to drive improvement.
Coordinators and academic leaders	Lead curriculum implementation, planning quality, moderation, coaching, instructional support, data review, and follow-up on agreed actions.
Teachers	Plan high-quality learning; implement effective pedagogy; differentiate appropriately; assess and respond to learning; maintain safe and respectful environments; communicate with students and parents as required.
Laboratory and workshop staff	Support safe preparation and effective use of practical spaces, tools, materials, and technical resources.
Students	Engage actively, behave responsibly, complete learning honestly, use feedback, contribute respectfully, and use technology appropriately.
Parents	Support attendance, routines, communication, home learning habits, and partnership with the school.

21. Monitoring, review, and continuous improvement

The effectiveness of teaching and learning at QSTSS should be monitored in ways that strengthen quality, support professional growth, and improve student outcomes. Monitoring should lead to improvement, not merely compliance.

Evidence source	Main purpose
Learning walks, lesson observations, and instructional reviews	Review the quality of planning, classroom practice, student engagement, questioning, assessment, relationships, challenge, and the overall learning climate.
Planning scrutiny and curriculum review	Check alignment, sequencing, coverage, assessment design, differentiation, and coherence across classes and year levels.
Student work scrutiny and moderation	Review the quality of tasks, standards, progression, feedback, and the impact of teaching on student work.
Assessment data and progress review	Identify trends, strengths, gaps, underachievement, and priorities for reteaching, intervention, support, or extension.
Student, parent, and staff feedback	Understand stakeholder experience, engagement, communication quality, and areas for improvement.
External review, accreditation, and MOEHE monitoring	Provide external validation, benchmarking, and recommendations that inform school improvement.

The uploaded teaching-domain criteria and evaluation guidance provide a useful operational reference for what strong teaching looks like in practice. These documents should inform coaching, review, and professional conversations alongside school and ministry expectations.

Related documents and review arrangements

This policy should be read alongside other current QSTSS and MOEHE documents, including but not limited to the curriculum framework, student assessment policy, behaviour policy, safeguarding expectations, digital and AI use guidance, laboratory and workshop safety procedures, and any relevant operational guidance.

The policy should be reviewed annually, or earlier when required by changes in legislation, national direction, curriculum requirements, assessment arrangements, safeguarding expectations, technology use, or school priorities.

Appendix A. QSTSS lesson design prompts

The following prompts are intended to support high-quality thinking when planning. They are not meant to create unnecessary paperwork.

Before teaching

- What do students already know, and what misconceptions are likely?
- What is the most important intended learning in this lesson or sequence?
- How will I make the purpose and relevance of the learning visible?
- What STEM, real-world, interdisciplinary, ethical, or sustainability connection is worth making here?
- How will I explain, model, scaffold, and check for understanding?
- How will I differentiate support, challenge, and access?

During teaching

- Are students participating actively and thinking at the right level of challenge?
- Which students need more support, more time, or more extension right now?
- What evidence am I gathering, and how will I respond to it in the moment?
- Am I using questioning and dialogue to deepen understanding rather than only checking recall?
- Am I keeping the core idea visible and helping students connect activities back to it?

After teaching

- What did students learn securely, and what remains insecure?
- Which tasks, explanations, or resources worked well, and why?
- Which misconceptions emerged, and how should I respond in future planning?
- What should I reteach, refine, remove, extend, or adapt next time?

Appendix B. Differentiation toolkit

This toolkit provides practical ways to differentiate without diluting the learning.

Need	Useful teacher responses
Students need clearer access to the content	Pre-teach vocabulary; use visuals, models, worked examples, demonstrations, shorter text chunks, subtitles, and annotated diagrams.
Students need more structure	Provide checklists, sentence stems, graphic organisers, guided questions, partially completed examples, or chunked tasks.
Students need more practice	Use short practice cycles, retrieval tasks, scaffolded repetition, and feedback checkpoints before independent work.

Need	Useful teacher responses
Students need more challenge	Increase abstraction, complexity, independence, transfer, critique, or design constraints; ask students to justify, compare, optimise, or evaluate.
Students struggle with written expression	Allow oral rehearsal, structured templates, labelled diagrams, collaborative drafting, and explicit language frames while still building writing capacity.
Students need language support	Clarify key vocabulary, simplify instructions without oversimplifying concepts, use visual support, and check comprehension frequently.
Students need behavioural or organisational support	Use routines, predictable structures, seating plans, timed steps, role clarity, and brief individual conferencing.

Appendix C. STEM pedagogy comparison matrix

Approach	Best for	Teacher role	Student role	Assessment focus
Inquiry-based	Developing understanding through investigation	Question-framer, facilitator, explainer, evidence coach	Observe, investigate, analyse, explain, reason	Quality of explanation, evidence use, conceptual understanding
Problem-based	Addressing a complex real-world issue	Problem designer, coach, checkpoint reviewer	Define problem, research, evaluate options, justify decisions	Reasoning, decision quality, use of evidence, feasibility
Project-based	Extended integration and product creation	Planner, milestone manager, feedback provider	Plan, create, revise, collaborate, present	Process, product, subject understanding, reflection
Design / engineering	Creating and improving practical solutions	Design brief writer, modelling coach, safety guide	Prototype, test, iterate, optimise, justify	Criteria/constraints, testing quality, iteration, design logic

Appendix D. SAMR examples for STEM subjects

Subject area	Substitution / Augmentation example	Modification / Redefinition example
Science	Digital lab sheet, labelled diagrams, auto-marked retrieval quiz	Sensor-based data capture, simulation comparison, collaborative evidence dashboard, multimedia explanation of findings
Mathematics	Digital practice set with feedback or graphing calculator app	Spreadsheet modelling, dynamic graph exploration, collaborative problem solving with live annotation and revision
Computer Science	Typed code in a standard environment with syntax feedback	Build a shared app, integrate external data, document testing online, and present iterations to authentic users
Design Technology / Engineering	Digital sketching or CAD substitution for paper drafting	Iterative CAD, 3D prototyping, test data logging, revision history, and public design review
Research / Interdisciplinary	Digital note-taking and source organisation	Collaborative research repository, interview capture, data visualisation, AI-assisted synthesis with verification and publication-ready presentation

Appendix E. SDG and values integration examples

Learning area	Possible integration prompt
Energy	How can we design or evaluate a more sustainable energy solution for a local context while considering efficiency, cost, safety, and environmental impact?
Water	How can scientific testing, engineering design, and responsible decision-making improve water quality or reduce waste?
Health	How do data, biology, technology, and ethics interact when addressing a public-health or wellbeing challenge?
Built environment	How can mathematical modelling, design, materials science, and user empathy support safer and more sustainable spaces?
Digital innovation	How can AI, coding, and digital tools be used responsibly to solve problems without compromising privacy, fairness, or human judgement?

Appendix F. Teaching and learning walkthrough indicators

These indicators are adapted from the uploaded teaching-domain and evaluation documents and can be used in walkthroughs, coaching, or self-review.

Domain	What strong practice looks like
Culture and expectations	Inclusive and respectful climate; high expectations; strong routines; students feel safe, valued, and ready to contribute.
Lesson design and delivery	Clear purpose, engaging start, logical sequence, meaningful student activity, strong transitions, and visible connection to prior learning.
Questioning and dialogue	Questions prompt reasoning, explanation, critique, and deeper understanding rather than only recall.
Differentiation	Tasks, supports, and scaffolds are adapted to readiness, learning profiles, language needs, and interests.
STEM connection	Learning links clearly to real-world problems, cross-curricular applications, inquiry, design, or evidence-based problem solving.
Technology integration	Technology meaningfully enhances research, analysis, collaboration, creativity, or feedback.
Assessment for learning	Frequent checks for understanding, clear criteria, timely feedback, and evidence that students improve their work.
Practical and applied learning	Safe, well-prepared practical activity; accurate data collection; interpretation of results; evidence-based conclusions and communication.