DETECTED • PROJECT DEVELOPMENT SERIES

The Project Development Toolkit

A practical guide for young innovators exploring biomedical science, health technology, engineering, artificial intelligence, and community-focused solutions.

From a question to a well-designed project.

Use this toolkit to identify a meaningful problem, investigate what is already known, plan a responsible project, build and test a prototype, evaluate evidence, and communicate what you learned.

WHO THIS IS FOR	WHAT YOU WILL FIND
Middle- and high-school students, STEM clubs, project teams, and first-time innovators.	A step-by-step workflow, research and design templates, testing plans, AI guidance, safety and ethics checks, budgeting tools, and presentation worksheets.

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How to use this toolkit

This is a working guide, not a one-size-fits-all recipe. Some projects may be research studies, some may be engineering prototypes, and others may be educational tools or community initiatives. Use the sections that fit your project, but do not skip the safety, ethics, evidence, and reflection steps.

Important: Projects involving health, biological samples, people, medical images, or AI-based health predictions need additional care. A student prototype is not a medical device simply because it uses health-related data or produces a classification. Do not use an unvalidated project to diagnose, screen, treat, or advise anyone.

A simple project pathway

STAGE	CORE QUESTION	OUTPUT
1. Discover	What problem or question matters?	Problem statement
2. Investigate	What is already known?	Background research and evidence map
3. Define	Who is affected, and what is the project trying to achieve?	Scope, users, requirements
4. Design	What could a responsible solution look like?	Concepts, design brief, plan
5. Build	What can be made with available time and resources?	Prototype or project deliverable
6. Test	How will we know how it performs?	Testing protocol and results
7. Improve	What does the evidence suggest should change?	Iteration log
8. Communicate	How can others understand and evaluate the work?	Report, poster, demo, or pitch

Suggested order

- Read Sections 1–4 before choosing a project direction.
- Complete the one-page project brief before buying materials or coding.
- Use the relevant technical sections while designing and building.
- Complete the safety and ethics review before collecting data, recruiting participants, or conducting tests.
- Keep the project log throughout; do not try to reconstruct it at the end.
- Use the final communication and submission templates to share your work.

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Worksheets and reusable templates

1. Start with a problem, not a product

Strong projects begin with a clear question or need. It is tempting to start with a device, app, sensor, or AI model and then search for a problem it might solve. A more useful approach is to understand a real problem first, then decide whether a tool or technology is appropriate.

1.1 Find a problem worth exploring

Look for problems in healthcare access, health education, disease detection, assistive technology, clinical workflows, environmental health, or scientific learning. You do not need to solve a large global issue. A focused, well-investigated question can make an excellent project.

- **Notice friction:** What is confusing, slow, expensive, inaccessible, or difficult to understand?
- **Listen carefully:** What do teachers, caregivers, community groups, or professionals identify as a challenge? Do not collect private health stories or personal records.
- **Observe a process:** Can you identify a general workflow or educational gap without observing confidential clinical activity?
- **Check assumptions:** Is the issue supported by evidence, or is it based only on an impression?

1.2 Turn a broad interest into a focused question

TOO BROAD	MORE FOCUSED
How can AI improve healthcare?	How do different image-preprocessing choices affect a classroom demonstration model's performance on a public, appropriately licensed image dataset?
How can we detect disease?	Can a low-cost educational sensor activity demonstrate how temperature measurements vary under controlled, non-medical conditions?
How can we help patients?	Can a redesigned plain-language instruction sheet improve students' understanding of a fictional appointment-preparation scenario?
How can we stop cancer?	What factors affect access to reliable skin-health information, and how could an educational resource explain when to seek professional advice?

1.3 Write a problem statement

Use this structure: [Group or context] experiences [specific challenge], which matters because [evidence-based consequence]. This project will investigate [defined question or opportunity] within [clear boundaries].

Example: “Students in introductory STEM programs may find machine-learning fairness difficult to understand. This project will develop a classroom activity that demonstrates how an imbalanced image dataset can affect model evaluation, using public educational data and without making medical claims.”

1.4 Check whether the problem is project-sized

- Can you explain the problem in two or three sentences?
- Can you investigate it with the time, skills, and resources available?
- Can you define what success would look like?
- Can you complete the work without unsafe testing or collecting sensitive personal data?
- Is there a meaningful way to evaluate the result?

If the answer to several questions is no, narrow the scope. A smaller project with credible evidence is stronger than an ambitious project that cannot be responsibly evaluated.

2. Research and evidence

Background research helps you understand the problem, learn from existing work, and avoid repeating mistakes. It should shape your design rather than appear as a last-minute bibliography.

2.1 Build an evidence map

Start with several kinds of sources: peer-reviewed research, government or public-health organizations, university and hospital educational material, technical documentation, standards, and reputable datasets. Use news and blogs to discover topics, not as the only support for technical or medical claims.

SOURCE TYPE	USE IT FOR	CHECK
Peer-reviewed papers	Methods, results, limitations, prior findings	Study design, sample, date, conflicts, limitations
Government / public health	Definitions, public guidance, population context	Jurisdiction, update date, intended audience
Technical documentation	Sensor, software, hardware, and model specifications	Version, assumptions, operating conditions
Datasets and repositories	Data provenance and reproducibility	License, consent/provenance, labels, missing groups
Expert or educator input	Context, practical constraints, feedback	Role, scope of expertise, possible conflicts

2.2 Search strategically

- Break your topic into 2–4 concepts and combine them with specific terms.
- Search for both supporting and conflicting evidence.
- Use date filters when the field changes quickly.
- Follow references from strong papers to identify foundational work.
- Record the exact title, author, year, publication, DOI or stable link, and the date you accessed it.

2.3 Evaluate each source

QUESTION	WHAT TO LOOK FOR
Who produced it?	Authors' expertise, institution, journal or organization, funding, conflicts.
What was studied?	Population, sample size, setting, data source, inclusion criteria.
How was it studied?	Methods, comparison group, measures, analysis, reproducibility.
What did it find?	Actual results, uncertainty, effect sizes, and whether claims match evidence.
What are the limits?	Bias, missing data, small samples, generalizability, outdated information.

2.4 Keep a literature matrix

SOURCE	QUESTION / METHOD	KEY FINDING	LIMITATION	HOW IT INFORMS MY PROJECT
Author, year	What did they investigate?	What did they report?	What should I be cautious about?	What design choice or question follows?

2.5 Identify the gap carefully

A project does not need to claim that nobody has ever done something. More often, it can address a local context, compare a design choice, create a clearer educational explanation, reproduce a published method, or test usability in a limited setting. Describe the gap modestly and cite the evidence that supports it.

Avoid statements such as “the first ever” or “no one has solved this” unless a thorough search supports them. Prefer: “This project explores…”, “We found limited examples of…”, or “Our contribution is…”

3. Define the project

Before building, write down what the project will and will not do. Clear boundaries protect your time and make your results easier to interpret.

3.1 Set a goal and measurable objectives

A goal describes the overall purpose. Objectives describe the specific work you will complete. Use action verbs such as investigate, compare, design, build, measure, evaluate, and communicate.

GOAL	OBJECTIVES
Develop an educational demonstration of sensor-based measurement.	1. Review how the selected sensor works. 2. Build a safe demonstration circuit. 3. Record readings under defined conditions. 4. Compare repeatability across trials. 5. Create a student-facing explanation.

3.2 Choose a project type

PROJECT TYPE	WHAT YOU PRODUCE	POSSIBLE EVALUATION
Research / investigation	A question-driven study using existing or approved data	Quality of method, analysis, reproducibility
Engineering prototype	A device, mechanism, or system	Functionality, reliability, usability, constraints
Software / AI	A program, model, or digital tool	Correctness, performance, fairness, security, usability
Education / outreach	A lesson, resource, or learning experience	Comprehension, accessibility, feedback, learning objectives
Community initiative	A program or service responding to a need	Reach, participation, feedback, feasibility, sustainability

3.3 Define users and stakeholders

Identify who might use, benefit from, maintain, or be affected by the project. Avoid assuming that one person's experience represents everyone. For health-related ideas, include qualified adult guidance and consider whether the project could create confusion, false reassurance, or unnecessary concern.

3.4 Write requirements and constraints

CATEGORY	QUESTIONS
Function	What must the project do? What is outside its scope?
Performance	What measurable target is reasonable for this stage?
Usability	Can the intended user understand and operate it?
Accessibility	Can people with different abilities and levels of experience use it?
Safety and privacy	What could go wrong? What data must not be collected?
Resources	What time, budget, equipment, software, and supervision are available?

3.5 Define success before testing

Choose measures that match the project. For a prototype, this may be whether it completes a defined task reliably. For a learning resource, it may be whether users can explain a concept after using it. For a model, it may include performance on a separate test set and an analysis of errors. Avoid choosing success criteria only after seeing the results.

4. Plan the project

A project plan makes the work manageable. Break the project into stages, identify dependencies, and leave time for testing and revision. Building should not consume the entire schedule.

4.1 Create a milestone plan

PHASE	TASKS	DELIVERABLE
Week 1: Define	Choose problem, write question, identify boundaries	One-page project brief
Weeks 2–3: Research	Find and evaluate sources; compare existing approaches	Evidence map and references
Week 4: Design	Create requirements, sketches, method, risk review	Design brief and test plan
Weeks 5–6: Build	Create a small first version; document changes	Prototype / first deliverable
Week 7: Test	Run planned tests; record results and failures	Results table and observations
Week 8: Improve	Prioritize changes; repeat relevant tests	Revised prototype
Week 9: Communicate	Prepare report, poster, demo, and reflection	Final presentation package

Adapt the schedule to your project. If the project involves approvals, external partners, purchasing, or specialist supervision, build in extra time.

4.2 Break tasks into manageable actions

- Replace “build the device” with a list of components, assembly steps, software tasks, and checks.
- Give every task one owner and a due date.
- Mark tasks that depend on approvals, materials, or another person's work.
- Review progress once a week and update the plan honestly.
- Keep a backup plan if a component, dataset, or service becomes unavailable.

4.3 Keep a project log

Record the date, what you planned, what you did, what happened, what changed, and what you will do next. Include failed attempts. A clear record of a problem and how you responded is evidence of real engineering and research practice.

DATE	PLAN / QUESTION	WHAT I DID	OBSERVATION / RESULT	NEXT STEP

4.4 Manage versions and files

- Use clear filenames, such as projectname_prototype_v03_2026-11-23.
- Keep raw data separate from cleaned or processed data.
- Record software, model, firmware, and dataset versions.
- Back up project files in an approved location.
- Do not place personal, medical, or identifying data in public repositories.

5. Design and build

Build the smallest version that can answer an important question. A simple prototype helps you discover practical constraints before you invest time in a complex design.

5.1 Explore multiple concepts

Sketch at least three possible approaches before selecting one. Compare them against the requirements rather than choosing only the most visually impressive idea.

CRITERION	CONCEPT A	CONCEPT B	CONCEPT C
Meets the core need			
Feasible with available skills			
Cost and time			
Safety and privacy			
Ease of testing			
Accessibility / usability			

5.2 Create a design brief

- **Purpose:** What need does the design address?
- **Intended user:** Who is it designed for?
- **Core functions:** What should it do?
- **Inputs and outputs:** What information or signals enter and leave the system?
- **Constraints:** What limits the design?
- **Risks:** What could fail or be misunderstood?
- **Evaluation:** How will you test whether it meets requirements?

5.3 Prototype in stages

1. **Paper prototype:** Draw the layout, workflow, or interface.
2. **Proof of concept:** Test the riskiest technical assumption with a small experiment.
3. **Minimum viable prototype:** Build only the features needed to demonstrate the core idea.
4. **Integrated prototype:** Connect components and check that they work together.
5. **Refined version:** Improve reliability, instructions, accessibility, and presentation.

5.4 Record design decisions

For every major choice, record the alternatives considered, the evidence used, the reason for the decision, and any trade-off. Example: “We selected a temperature sensor because the learning objective is to demonstrate measurement and calibration, not to infer a medical condition.”

5.5 Build for repair and reproducibility

- Use components and materials appropriate for the age group and supervision available.
- Label connections and document assembly steps.

- Keep a bill of materials and note substitutions.
- Make the design easy to inspect and maintain.
- Avoid mains electricity, high-energy components, hazardous chemicals, or biological materials unless a qualified institution has approved and supervises the work.

6. Testing, data, and evaluation

Testing should answer a defined question. Decide what you will measure, how you will measure it, what conditions must stay consistent, and what result would count as a meaningful improvement.

6.1 Write a test protocol

ELEMENT	DEFINE BEFORE TESTING
Test question	What specific performance or behavior are you evaluating?
Method	What steps will be followed, in what order?
Conditions	What conditions must remain the same?
Measures	What will be recorded, and in what units?
Trials	How many repeated trials are feasible and appropriate?
Comparison	What baseline or reference will you use?
Stopping rule	When should the test stop because of a fault or safety concern?

6.2 Understand variables

- **Independent variable:** the factor you deliberately change.
- **Dependent variable:** the outcome you measure.
- **Controlled variables:** factors you keep consistent.
- **Confounders:** other factors that could explain the observed result.

6.3 Record data transparently

- Write down the method before collecting results.
- Record raw observations as they occur; do not silently replace or delete inconvenient values.
- Note missing values, errors, failed trials, and changes to the procedure.
- Use units, timestamps where appropriate, and consistent labels.
- Separate observations from interpretations.
- Do not claim that a small number of trials proves broad real-world performance.

6.4 Analyze results

Choose analysis that matches the question and the amount and type of data. Begin with clear tables and plots. Summarize distributions, variability, and patterns. If using statistics, explain why the method is appropriate and what assumptions it makes. Do not treat a visually appealing graph as proof of causation.

6.5 Evaluate errors and limitations

- Did the measurement tool have limited precision or require calibration?
- Were conditions consistent across trials?
- Was the sample too small or unrepresentative?
- Could labels, measurements, or data collection contain errors?

- Did the test reflect the environment where the product might eventually be used?
- What result would make you change your conclusion?

6.6 Report negative or unexpected results

A prototype that does not work as intended can still produce a valuable project. Explain what failed, what evidence you collected, what you learned, and what you would change. Never alter, omit, or invent results to make a project appear successful.

7. AI and digital health projects

AI projects require careful attention to data quality, evaluation, transparency, privacy, and the consequences of errors. A model that performs well on one dataset may perform poorly in another setting or for groups that are underrepresented.

7.1 Define the AI task precisely

Describe the input, intended output, user, and purpose. Is the model classifying images, detecting an object, predicting a value, summarizing text, or supporting a learning activity? State what the model is not intended to do.

7.2 Understand the data

- Record where the dataset came from, who created it, what it contains, and its license or terms of use.
- Check whether the data is appropriate for the task and whether its labels are reliable.
- Look for missing groups, duplicate records, imbalanced classes, and possible data leakage.
- Do not scrape private accounts, collect clinical records, or use identifiable images without appropriate authorization.
- Do not assume public availability means unrestricted reuse.

7.3 Separate training, validation, and testing

Use a clear data-splitting strategy. Keep the test set separate from model development decisions. For repeated measurements or related images from the same person or source, split at the appropriate subject or source level to reduce leakage. Document the split method and random seed where relevant.

7.4 Evaluate more than accuracy

MEASURE	WHAT IT TELLS YOU	CAUTION
Accuracy	Share of all predictions that are correct	Can hide poor performance on minority classes
Sensitivity / recall	Share of actual positives identified	False negatives may matter greatly in health contexts
Specificity	Share of actual negatives correctly identified	Does not describe all error types
Precision	Share of positive predictions that are correct	Changes with prevalence and dataset composition
Confusion matrix	Breakdown of correct and incorrect classes	Requires clear class definitions and adequate examples
Calibration	Whether predicted probabilities match observed frequencies	Needs suitable data and evaluation

7.5 Investigate fairness and generalization

- Where meaningful and ethically permissible, examine whether performance differs across relevant subgroups.
- Report subgroup sample sizes and uncertainty; avoid drawing conclusions from tiny groups.
- Look for dataset shift between the training data and the intended environment.
- Explain that subgroup analysis does not establish clinical fairness or safety.
- Consider how the system could be misused or misunderstood.

7.6 Make AI limitations visible

Clearly label prototypes and educational demonstrations. Explain that outputs can be wrong, that confidence scores are not guarantees, and that model explanations such as heatmaps are not proof that a model reasons correctly. Never present a student model as a diagnostic authority or use it to make decisions about a person's health.

7.7 Document the model

ITEM	RECORD
Model name and version	
Architecture / method	
Training data and license	
Preprocessing and labels	
Training and evaluation split	
Metrics and subgroup results	
Known limitations and intended use	
Software / hardware environment	

8. Ethics, privacy, safety, and responsible innovation

Responsible project design is not an optional final checklist. It should influence the problem you choose, the people you involve, the data you use, the prototype you build, and the claims you make.

8.1 When a project involves people

Before surveying, interviewing, observing, or testing with people, talk with a teacher, parent or guardian as appropriate, and the relevant school or institutional supervisor. Formal research involving human participants may require review and approval before any recruitment or data collection. A classroom activity or informal feedback session is not automatically exempt from applicable rules.

- Explain the purpose, what participation involves, and how information will be used.
- Participation should be voluntary, with no pressure or penalty for declining.
- For minors, follow school, guardian, and institutional permission requirements.
- Collect only the minimum information needed.
- Do not ask participants to disclose diagnoses, medications, medical histories, or other sensitive details for an ordinary student project.
- Provide a way to stop participating and explain how data will be handled.

8.2 Protect privacy and data

- Do not collect identifiable health information unless a qualified institution has approved the project and safeguards.
- Use synthetic, de-identified, or appropriately licensed public datasets when possible.
- Remove names, faces, contact details, location metadata, and other identifiers when they are not necessary.
- Restrict access, use secure storage, and set a retention and deletion plan.
- Do not upload sensitive information to public AI tools or unapproved platforms.
- Obtain permission before sharing photographs, quotations, or identifiable project stories.

8.3 Physical and laboratory safety

Use age-appropriate, low-risk materials and follow manufacturer instructions. Get qualified adult supervision for tools, soldering, electrical systems, chemicals, biological materials, or laboratory equipment. Do not culture unknown organisms, handle human or animal tissue, collect bodily fluids, or conduct procedures on people or animals as an independent student activity. Work involving biological samples or potentially hazardous equipment belongs in an appropriately supervised and approved setting.

8.4 Health-related claims

Distinguish educational demonstration, technical feasibility, research evidence, and clinical validation. These are not interchangeable.

CLAIM LEVEL	WHAT YOU CAN SAY
Educational demonstration	“This activity demonstrates how a sensor measures temperature under controlled conditions.”
Prototype performance	“In our defined bench test, the prototype completed X out of Y trials.”
Exploratory research	“These preliminary results suggest a question for further investigation.”

CLAIM LEVEL	WHAT YOU CAN SAY
Clinical claim	Requires appropriate evidence, qualified oversight, regulatory assessment, and validation; do not make this claim for an unvalidated student prototype.

8.5 Intellectual property and attribution

- Credit the authors, datasets, code, images, and tools you use.
- Check licenses before adapting or redistributing materials.
- Ask permission before using another person's design, photographs, or unpublished work.
- Agree on authorship and contributions early in team projects.
- Do not describe another person's work as your own.

8.6 A simple go / pause / stop review

GO	PAUSE AND ASK FOR SUPERVISION	STOP / REDESIGN
Low-risk desk research; public educational data used within its license; cardboard mock-ups; supervised low-voltage classroom activities.	Human-participant surveys; health-related datasets; image data; soldering; specialized equipment; potentially sensitive feedback; external deployment.	Unapproved testing on people or animals; collection of identifiable health data without authorization; unsafe biological work; claims that an unvalidated prototype diagnoses or treats.

9. Budgeting and sourcing

A realistic budget helps you decide what to build and prevents avoidable spending. Estimate costs before purchasing and include shipping, taxes, replacement parts, and consumables.

9.1 Build a bill of materials

ITEM	PURPOSE	QTY	UNIT COST	TOTAL	SOURCE / NOTES

9.2 Include hidden costs

- Shipping, taxes, and currency conversion.
- Tools, adapters, cables, batteries, and protective cases.
- Replacement parts and failed prototypes.
- Printing, packaging, accessibility needs, and translation.
- Software subscriptions, hosting, or data storage.
- Travel or event costs, where approved.

9.3 Compare suppliers responsibly

- Check specifications, compatibility, warranty, and return policy.
- Prefer reputable suppliers and age-appropriate products.
- Confirm whether software, datasets, and components can be used for your intended purpose.
- Do not bypass safety protections or substitute unknown components in a safety-critical design.
- Keep receipts and record who approved purchases.

9.4 Track spending

DATE	ITEM	PLANNED COST	ACTUAL COST	PURCHASED BY	RECEIPT / NOTE

9.5 If applying for a microgrant

Explain the problem, what you plan to do, why the materials are necessary, how the budget was estimated, and what you expect to produce or learn. Make the request specific and proportional. A microgrant is not a reason to buy every possible component; prioritize the items essential to answering your project question.

10. Teamwork and project management

Teams work best when responsibilities are clear and decisions are documented. A small team can be effective when each person owns a meaningful part of the work.

10.1 Example team roles

ROLE	RESPONSIBILITY
Project lead	Coordinates milestones, meetings, and overall scope.
Research lead	Maintains source log, literature matrix, and evidence summaries.
Engineering / build lead	Coordinates hardware, software, prototyping, and technical documentation.
Testing and data lead	Maintains test protocol, data records, and analysis.
Communications lead	Coordinates report, poster, visuals, and outreach.
Safety / ethics contact	Checks that questions are raised with the appropriate adult or institutional supervisor; does not replace formal review.

Roles can overlap. Each team member should understand the project's overall purpose and be able to explain the work honestly.

10.2 Team agreements

- Agree on the project goal, scope, communication channel, and meeting schedule.
- Set expectations for response times and task completion.
- Record decisions and action items after meetings.
- Discuss how credit and authorship will be assigned.
- Raise safety, privacy, and reliability concerns early.
- Resolve disagreements using evidence and the agreed project criteria.

10.3 Weekly check-in

PROMPT	TEAM NOTES
What did we complete this week?	
What evidence or results did we collect?	
What is blocked, and what support is needed?	
What are the top three priorities for next week?	
Have any safety, privacy, or scope concerns changed?	

11. Communicating your work

A strong project is not complete until other people can understand what you did, why you did it, how you tested it, and what the evidence supports. Good communication is clear, honest, and specific.

11.1 The project summary

Use this structure for a short abstract or project description:

1. **Problem:** What challenge or question did you investigate?
2. **Purpose:** What did you set out to do?
3. **Method:** What did you build, compare, or analyze?
4. **Results:** What did you observe? Include meaningful numbers where appropriate.
5. **Conclusion:** What do the results support, and what remains uncertain?
6. **Next steps:** What would you improve or investigate next?

11.2 Poster or presentation structure

SECTION	INCLUDE
Title and team	Specific title, names, school or organization if appropriate
Background	Problem context and a few key sources
Question and objectives	Clear question, goal, and measurable objectives
Methods / design	Process, materials, architecture, or study design
Results	Graphs, tables, prototype photos, and observations
Discussion	Interpretation, limitations, errors, and implications
Conclusion and next steps	What you learned and what remains to be done
References and acknowledgements	Sources, tools, datasets, mentors, and contributions

11.3 Explain a prototype in a live demo

1. State the problem and intended user.
2. Explain the core idea in plain language.
3. Show the prototype and identify its main components.
4. Demonstrate one controlled, repeatable task.
5. Explain what the demonstration does not prove.
6. Share one challenge, one improvement, and one next step.

11.4 Make visuals trustworthy

- Label axes, units, sample sizes, and conditions.
- Show uncertainty or variation when relevant.
- Do not crop graphs or select examples to hide poor results.

- Label illustrative images and simulated data clearly.
- Use accessible contrast, readable text, captions, and alternative descriptions.
- Cite images, diagrams, datasets, and adapted figures.

11.5 Prepare for questions

Be ready to explain why you chose your method, what alternatives you considered, how you checked your results, what the biggest limitation is, and what evidence would change your conclusion. It is acceptable to say, “We did not test that,” or “We do not know yet.”

12. Project review and reflection

At the end, evaluate both the outcome and the process. Reflection helps you understand what was learned and what should happen next.

12.1 Final quality review

- The problem and project question are clearly stated.
- The background research includes credible, relevant sources.
- The methods are described well enough for someone to understand what was done.
- The results are reported accurately, including failures and unexpected outcomes.
- The conclusion matches the evidence and does not overstate impact.
- Safety, privacy, permissions, and attribution have been addressed.
- The project files, code, data, and design decisions are organized.
- The next steps are realistic and specific.

12.2 Reflect on the process

REFLECTION QUESTION	YOUR NOTES
What is the most important thing I learned?	
Which assumption changed, and why?	
What worked better than expected?	
What failed or was more difficult than expected?	
What limitation most affects the conclusions?	
What would I do differently with another month?	
What is the next responsible step?	

12.3 Decide what comes next

OPTION	WHEN IT MAY BE APPROPRIATE
Stop and document	The question has been answered sufficiently, or further work is not justified.
Improve the prototype	Testing identified a specific, fixable limitation.
Run a new study	A new question or additional evidence is needed and can be collected responsibly.
Seek expert guidance	The next stage requires specialist knowledge, institutional approval, or equipment.
Share the project	The work is ready for a report, showcase, student innovation submission, or educational resource.

A project does not need to become a company, a medical product, or a published paper to be worthwhile. A careful investigation, a useful learning resource, or a well-documented prototype can be a meaningful contribution.

Worksheets and reusable templates

Copy these templates into a notebook or digital document and complete them as your project develops.

Template A — One-page project brief

FIELD	COMPLETE THIS
Project title	
Team / contact	
Problem statement	
Why it matters / evidence	
Project question	
Goal	
Three to five objectives	
Intended users / stakeholders	
Project type	
What is in scope?	
What is out of scope?	
Success measures	
Key risks / approvals to check	
Time and budget	

Template B — Research source record

FIELD	NOTES
Full citation / link	
Source type and date	
Research question / purpose	
Method / data source	
Main findings	
Limitations / possible bias	
How it informs my project	
Follow-up sources or questions	

Template C — Experiment or test plan

FIELD	NOTES
Test title and date	
Question / hypothesis	
Independent variable	
Dependent measure and units	
Controlled conditions	
Equipment / software	
Step-by-step method	
Number of trials / rationale	
Data recording method	
Potential errors / confounders	
Stop conditions / safety measures	
Analysis plan	

Template D — Prototype iteration log

VERSION / DATE	CHANGE MADE	WHY	TEST / OBSERVATION	DECISION

Template E — Risk and ethics review

QUESTION	YES / NO / NOTES
Does the project involve people, interviews, surveys, or user testing?	
Does it involve minors or potentially vulnerable participants?	
Does it collect or use health, biometric, image, location, or identifying data?	
Does it involve biological materials, chemicals, animals, or specialized equipment?	
Could the output be mistaken for medical advice or diagnosis?	
Could the tool or data be misused or expose private information?	
Which adult, school, or institutional approvals are required before proceeding?	
What safer alternative or data-minimization approach can be used?	

Template F — Budget worksheet

ITEM	WHY NEEDED	QTY	UNIT COST	TOTAL	SOURCE
SUBTOTAL					
Shipping / tax / contingency					
TOTAL REQUEST					

Template G — Final project summary

SECTION	PROMPTS
Project title	What is the project called?
Problem	What challenge or question did you investigate?
Purpose	What did you aim to learn, design, or build?
Methods	What steps, tools, data, or materials did you use?
Results	What did you observe or measure?
Conclusion	What does the evidence support?
Limitations	What was not tested or remains uncertain?
Next steps	What would you improve or investigate next?
Acknowledgements	Who provided guidance, materials, or support?
References	Which sources, datasets, code, and images did you use?

Template H — Project pitch (60–90 seconds)

1. The problem: “We noticed that…”
2. Why it matters: “This matters because…”
3. Our idea: “We are exploring / developing…”
4. What we did: “We investigated / built / tested…”
5. What we learned: “Our results suggest…”
6. What comes next: “The next step is…”

Quick glossary

TERM	PLAIN-LANGUAGE MEANING
Bias	A systematic influence that can make data, measurement, or model outputs unfair or inaccurate.
Calibration	Checking or adjusting a measurement system against a known reference.
Confounder	A factor that may influence the result and make interpretation harder.
Dataset shift	A difference between the data a model was developed with and the data it encounters later.
De-identification	Removing or reducing information that could identify a person; it does not always eliminate re-identification risk.
Explainability	Methods intended to help people inspect factors associated with a model output; explanations are not necessarily proof of correct reasoning.
Hypothesis	A testable proposed explanation or prediction.
Iteration	A cycle of making a change, testing it, and learning from the result.
Prototype	An early version used to explore or test a design.
Reproducibility	The ability to understand and repeat a process using documented methods and materials.
Transfer learning	Adapting a model already trained on one task or dataset to a related task.
Validation	Evaluating whether a method or system performs appropriately for a defined purpose and context.

A final note from DetectED

Innovation is a process of asking better questions, learning from evidence, testing ideas, and improving what you create. You do not need to begin with advanced equipment or a fully formed solution. Begin with a meaningful question, work carefully, document honestly, and ask for guidance when a project moves beyond your experience or permissions.

Make your next step a responsible one.

This toolkit is educational guidance, not legal, medical, regulatory, or institutional ethics advice. Requirements vary by school, jurisdiction, competition, and project type. Consult a qualified teacher, parent or guardian, institutional supervisor, or relevant professional before work involving people, health information, biological materials, animals, specialized equipment, or potential clinical use.

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