# Early stage 1 STEM learning framework

 Identify and define phase

Table 1 Prompts and learning tools for identify and define phase

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| What we are looking for  | Question prompts to guide learning  | Possible learning tools to capture learning |
| Explore and identify how people design and produce familiar products services and environments. | Who designs things?Find some things that have been designed in our space? Why were they designed?What do designers need to think about when making a design? | [Gallery walks](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/555#.Xt77TF56o-M.link)[Brainstorming](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542#.XuG1y9K_Pjc.link)[Using keywords](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/565#.XuG1y1Nze-U.link)[STEM journal/design folio](https://docs.google.com/presentation/d/1riWdXBRu5ug9DQ1ib2tBIvDy8jBnSCNsYUvmJPLwtY4/template/preview) |
| Identify and explore familiar information and ideas during a discussion or investigation. | What is the situation or problem?How would you compare this situation to another…? How would you group this information to show similarities of differences?What facts or ideas show an outcome for the situation or problem?  | [Simple graphic organiser](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/599#.Xtmqei5RGpE.link)[Design thinking – design folio](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/619#.Xt7_L7K7Sz8.link)[Learning intentions and success criteria](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/622#.Xt7_L-KcCy4.link) |
| Identify that others have different needs. | Who were the stakeholders? Who has been impacted? What are the stakeholders thinking about the situation that are/were in? How do they feel about the situation? What did they say? Can you list three different actions? Why did they choose to act this way?How would you describe what they need? | [Plus minus interesting](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/551#.Xtnd8n2lkn8.link)[Hot seat](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/569#.Xtneb2YcUgs.link)[Empathy map (DOCX 84.3KB)](https://education.nsw.gov.au/content/dam/main-education/teaching-and-learning/curriculum/key-learning-areas/stem/media/documents/stem-es1-s1-s2-s3-empathy-map-design-thinking.docx)[Six thinking hats](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/545#.XuG1ZJn0OwU.link) |
| Share understanding of the terminology within the driving question. | What is the problem I need to solve? Why is this a problem?What is the driving question asking us to do? What do we know? What do we need to know? How can we find out?What do other people think about this? What other questions do you have? | [Wonder walls](https://www.pinterest.com.au/3hokiesncville/wonder-wall/)[Affinity diagram](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/576#.Xtneb15BYog.link)[Brainstorming](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542#.Xtneb0qMVBM.link)[5 Whys strategy](https://simonsinek.com/find-your-why/?ref=mainNav)[Concept mapping](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/577#.Xt77TJTijDY.link) – What if we do nothing?[Rubrics](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/544#.Xt8G0QI4224.link) Allow flexibility in your rubrics to account for multiple learning paths and project variation. |

****Research and plan phase

Table 2 Prompts and learning tools for research and plan phase

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| What we are looking for | Question prompts to guide learning  | Possible learning tools |
| Identify and describe needs or opportunities when designing. | With the knowledge that we have from the empathise phase - What decisions can we make? How would you decide...?How can we find out the most important ……?Who can help us …?  | [Brainstorming](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542#.Xtneb0qMVBM.link)[Concept mapping](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/577#.Xt77TJTijDY.link)[Plus minus interesting](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/551#.Xtnd8n2lkn8.link)[Hot seat](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/569#.Xtneb2YcUgs.link) |
| Pose questions based on interests and life experiences that relate to the problem. | What other questions do you have?Do we need to find more information about…?How do you feel about …?How can we find out …? | [Peer discussion and conferencing](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/547#.Xt76bqE31fM.link)[Student generated lists](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/563#.Xt76rxfLKqk.link)[Mini whiteboards](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/575#.Xt77FouPpyw.link) |
| Explore similar information or representations from given sources.  | How would you describe...?What are the parts of …? How is it related to …? Why do you think …? What else is different about...?  | [Affinity diagram](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/576#.Xtneb15BYog.link)[Frayer diagram](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/553#.Xt8H40ZV3fo.link) |
| Connect information from one context to another. | What have we learnt about …?What examples can you find to help your ideas?What if we …? What other way could you...?What can you say about …? | [Simple graphic organiser](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/599#.Xtmqei5RGpE.link)[Concept mapping](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/577#.Xt7ARiLax2Q.link)[Mini whiteboards](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/575#.Xt77FouPpyw.link) |
| Consider sustainability to meet personal and local community needs. | What if our design solution is not used?How would you show …?How will we understand know what others need?How would you use …? | [Gallery walks](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/555#.Xt77TF56o-M.link)[Brainstorming](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/542#.XuG1y9K_Pjc.link)[Using keywords](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/565#.XuG1y1Nze-U.link) |
| Use imagination to create and make simple connections between ideas. | What is imagination? What if I you could join two good ideas to make a better one?Have you thought of as many ‘out of the box’ ideas as you can? What if you tried...?What could be joined to improve, adjust or change …?Can you think of a new way for the …? | [Concept mapping](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/577#.Xt7ARiLax2Q.link)[Hexagonal thinking](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/579#.Xt7DFbxMTSQ.link) |
| Suggest alternative and creative ideas to approach a given situation or task. | Can you tell me the reason …? Can you try a different way…? Can you invent …?How can we compare ideas?How would you add on to create a different …?What way would you design …?What ways could we help them? | [Thinking hats](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/545#.Xt77THeAg3I.link)[Question formulation technique](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/568#.Xt7_L96OQpw.link) |
| Share and discuss ideas from feedback. | Why have you used this idea? OR What is special about this idea?Do you agree with what others say about...?How are you going to use what your friends say about your ideas?Will you change your ideas now? How? | [Thinking hats](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/545#.Xt77THeAg3I.link)[digital-learning-selector](https://app.education.nsw.gov.au/digital-learning-selector/LearningTool/Browser?cache_id=845bd)[Storyboarding](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/559#.Xul7_qrkPB4.link) |
| Make predictions in a given situation when putting ideas into action.  | What do you think will happen?What do you mean by...? What could happen when or if...?How are you going to decide which ideas to use? | [Digital-learning-selector](https://app.education.nsw.gov.au/digital-learning-selector/LearningTool/Browser?cache_id=845bd)[Thinking hats](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/545#.Xt77THeAg3I.link) |

****Produce and implement phase

Table 3 Prompts and learning tools for produce and implement phase

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| ****What we are looking for**** | Question prompts to guide learning  | Possible learning tools |
| Develop and record design ideas through describing, drawing and modelling. | Can you tell me more about your drawing?Why did you use … to make your model?Explain what is happening …?Could you build a model that would change …? How would you tell others about your design? | [Storyboarding](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/559#.Xt7-CNSZlIs.link)[Learning intentions and success criteria](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/622#.Xt7_L-KcCy4.link) |
| Identify and share the thinking used to solve problems. | How could you decide…? What choices helped you decide …?What decision can you make …? How would you explain …? | [Peer feedback](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/549#.Xt8IpCfGyq8.link)[Peer discussion and conferencing](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/547#.Xt8IpA9c4E0.link) |
| Develop solutions to an identified need using found materials. | What are found materials? How would you use them to …?How could you use found materials in different ways to ...?What would happen if …? | [Learning intentions and success criteria](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/622#.Xt7_L-KcCy4.link) |
| Uses simple plans to create a design solution. | What other ways could you plan to …?How can the materials chosen be used to make …?Does the plan help make the ….? | [Rubrics](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/544#.Xt8G0QI4224.link) |

****Test and evaluate phase

Table 4 Prompts and learning tools for test and evaluate phase

|  |  |  |
| --- | --- | --- |
| What we are looking for | Question prompts to guide learning  | Possible learning tools |
| Evaluate success of design ideas, according to personal preferences and/or predetermined criteria. | How would you group your ideas ….to show …?How would you show what you know about …?How can you decide …?How would you use what you learned to make …? | [Rubrics](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/544#.Xt8G0QI4224.link) |
| Consider and discuss the impact of a design solution within an environment. | What would happen if ……? How could you decide…? What possible problems can you see if …….? Can our design … or ……? | [Logic modelling](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/581#.XuG1y3YLUgA.link) |
| Communicate creative ideas with known audiences for feedback. | Why have you chosen this idea? How does it work?What do you mean by...? Tell me more about ……What are some possible problems with...?What do you know about ……?What did other people think? | [Question formulation technique](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/568#.Xt7_L96OQpw.link)[Mystery feedback](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/573#.Xt8Whx36XYY.link)[Video performance](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/578#.Xt8J1_tc0Mc.link) |
| Identify the thinking used to solve problems. | How did you decide to include...? Why?What information would you choose to show ….?How could you decide …?What is the most important …? | [Digital learning selector](https://app.education.nsw.gov.au/digital-learning-selector/LearningTool/Browser?cache_id=0ebea) |
| Identify personal satisfaction with the tasks or actions undertaken. | What do you now know and understand?What would have to happen for...?Why have you chosen …?What are you most proud of? Why?What would you change if you did it again?  | [Learning intentions and success criteria](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/622#.Xt7_L-KcCy4.link) |
| Identify and share thinking about possible ways of presenting learning. | What changes would you make to explain …? How would you improve …?What else can you tell me about how …?What are other ways we can tell people about our idea? | [Concept mapping](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/577#.Xt77TJTijDY.link) [Storyboarding](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/559#.XtmuCyTXLsI.link)[Peer discussion and conferencing](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/547#.Xt8IpA9c4E0.link) |
| Use appropriate terms and concepts when presenting to a known audience. | What is meant by …? Is there any more to do?What can you say about …?Which is the best idea/design …? WhyIs there room for improvement? Where? How? | [Student generated lists](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/563#.Xt76rxfLKqk.link)[What did we learn today?](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/558#.Xt8Wh6fZwQo.link)[Rubrics](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/544#.Xt8G0QI4224.link) |
| Identify and share the design solution as part of the design thinking process. | What would you use to show and tell people about your design solution? How did you make …?What was used to make the presentation? Why?How would you tell or show people the steps you used to..? | [Gallery walks](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/555#.Xt77TF56o-M.link)[Digital learning selector](https://app.education.nsw.gov.au/digital-learning-selector/LearningTool/Browser?cache_id=0ebea)[Storyboarding](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/559#.XtmuCyTXLsI.link) |
| Upon completion of the design process, connect feedback to learning for improvement. | How am I going? (What progress can be made towards a new goal?)How will you use what you have learned? (What learning, ways of working will support me best?)Where to next? (What activities need to be undertaken to make better progress?) | [Peer feedback](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/549#.XumUv8-M5vE.link)[What did we learn today?](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/558#.XumUv7nO2cM.link)[Parking lot](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/570#.XumUv-qlkcA.link)[KWLH](https://app.education.nsw.gov.au/digital-learning-selector/LearningActivity/Card/562#.XumUv5C3yHg.link) |

Through STEM project-based learning, students have the opportunity to celebrate their learning through assessment opportunities.

These could be in the form of:

* STEM journals and or digital portfolios
* demonstrations and performances
* documentaries
* writing pieces
* infographics
* debates
* final product reviews, presentations to multiple audiences
* showcases, expos and presentations of design solutions to stakeholders.