Steminist Discover
Teachers Guideline

steministdiscover.com

STEP 1 - DEFINE

Summary

We have to clearly define what the problem is first. We must decide exactly what needs to be solved and give proper context to the problem.

Details

1. Make sure you able to determine what your problem is, which relevant to stakeholders, business, and users needs/problem.
2. Always ask for a feedback from your stakeholders & users.
3. Please dont forget to brainstorm & write down everything you know about your topic
4. Make a list of all the keywords you know about the issue, to breakdown the issue cleary/easily when you conducting a research/information.
5. Then you can create the question you want to ask as the initial question. Start with the question Who? and what? Where? When will that happen? Why did you do it, and how did you do it?

Teacher Details

Some of the following ideas can be used, see the example too to determine how the teacher created her students' long term inquiry (5-6 weeks)

- **Creating a Hook**

Here you as a teacher can guide them to see the big picture or a local issue or an item from the news (connect to the community). It needs to make students stop, think, and be bothered.

- **Restating/rephrasing the problem**

Brainstorming options leads to better, more versatile ideas. It reveals things about the problem that isn't obvious. This leads to hearing unique perspectives from others.

STEP 1 - DEFINE

- **Challenging assumptions**

Helps sometimes to understand how the problem may have originated, so review the history. This challenges students to consider an issue in different ways. Helps students question assumptions as these can limit independent thought.

Preliminary researching and gathering facts

Provides opportunities for developing some initial useful research/data analysis. Students discover surprising things about a problem they didn't know before. Helps avoid assumptions and forming opinions without ample information. It gives students the time to think about why finding a solution to the problem is important.

Creating Teams

Team members can devote themselves to a specific project detail if they wish, depending on their individual strengths and talents.

Considering multiple perspectives

Helps students to think of others and develop open-mindedness and encourages students to consider the far-reaching effects of a problem or issue. Let's students empathize with other professional, creative, or cultural viewpoints.

Reversing the problem

Reversing a problem can give students a better perspective on the problem's severity, and help them work towards a more effective solution. For example, what will happen if this continues? Considering what could make a problem worse can lead students to consider solutions that they may not have thought about.

Example
Dolphins in the Mandurah Estuary near Perth in Western Australia

Creating a Hook
Activity 1
Community involvement (if possible), such as incursion, or skyping a scientist about a problem, etc.
Our Example: Skyping an associate professor at a local university and watching a video about dolphins Entangled in fishing line a Dolphin in the Estuary near them.

Estuary Guardians Mandurah warn of fishing line danger to wildlife after death of third dolphin calf Meelan

Samantha Ferguson   Community

LOCAL NEWS

1   Divers find body of missing eight-year-old boy in water near Walpole

2   Mandurah and Murray Council elect results 2021: Williams re-elected as mayor of Mandurah

3   Tornadoes sure put a spin on things

4   Six-storey complex proposed for Smart Street Mall | Photos

5   Man flown to Perth after dumped by wave

6   Beloved Mandurah boxer Alex Winwood gets tattoo paying homage Olympic debut

FAMILY: Calf Meelan with his mother. Photo: Estuary Guardians Mandurah.

A dolphin calf, affectionately named 'Meelan' by the Estuary Guardians Mandurah, is likely to have passed away just after being spotted entangled in braided fishing line, hooks and weeds.

The Estuary Guardians group posted that Meelan's mother had been sighted alone and that "she would not have left or given up on her calf until she had to".

Fishermen spotted the calf struggling and "significantly" entangled, weighed down in the tail area, and reported the sighting to authorities.

Find out restating/rephrasing the problem
Activity 2
Brainstorm possible issues connected to something relating to the community.
Our Example: Human impacts on dolphins in our local estuaries. The Mandurah dolphins that inhabit the Peel-Harvey Estuary and adjacent coastal waters are **Indo-Pacific bottlenose dolphins**. They are highly social creatures that can often be found traveling in groups of 5 - 15 dolphins or even higher.

STEP 1 - DEFINE

Preliminary researching and gathering facts

Activity 3 - Find out
Students to complete a 'Jigsaw' activity, where all teams present their learning about the concept their group researched. The other teams take notes in the remaining blank boxes.

Our Example: Information about our local estuary dolphins and the issues they face.

Activity 4 - What are we interested in?
Determine an immediate but short course of action to connect students with their community and local issues. This will preferably be student-driven.

Our Example: Students complete a clean-up at the local beach. They do a basic analysis of the rubbish that they have found, and bring some back to school to create artwork with.

Creating Teams
Develop research teams among the students, and have them determine aspects of the issue that they will research. Begin to develop a basic research base to underpin the inquiry.

Our Example: Activity with 8 empty boxes - students only fill their own box during the research phase.

STEP 2 - DISCOVER

Summary

This is the stage of researching and gathering,and analyzing clear knowledge about the problem. This helps us to give the problem context so that we can identify with it easier.

Details

1. In this section you will report on your experiments if you completed any and tell the reader what you did and what you found out.
2. List 5 new facts that you have found out from your resources? How do you know these are facts and not an opinion? List 3 sources, which are where you found your facts? This could be URL of websites or the names of the articles. Include diagrams or pictures.
3. Speak to an Expert (How do you know they are an Expert?). Write down 3 things they shared with you.

- **Locating Information**

It teaches students effective search skills and the notion of multiple sources of information. Students become able to determine at a glance what is useful to them if they have clearly defined their problem.

- **Filtering for Facts**

Learning to identify facts will help students find evidence (rather than opinion) and helps students to present their research in a more unbiased manner.

- **Taking smart notes**

Good note taking ensures students are better organized. Use dot points and put different sources in different colours.

- **Analyzing, authenticating, and arranging materials**

Ensure students look at the sources of information and help them to authenticate information found. Authentication encourages the habit of checking information sources for validity and currency, an important practice in information gathering.

- **Engage with experts and stakeholders**

Ask gentle questions of experts to determine where they have sources their knowledge. How do they know what they know? Get students to think about this and ask them to ask questions if the students are unsure.

- **Taking smart notes**

Good note taking ensures students are better organized. Use dot points and put different sources in different colours.

Example

Dolphins on the Mandurah Estuary.

Activity 5 what have we found?

Do some further analysis of the previous experience to cement the connections that the students have formed with the issue?

Our Example: Categorise the collected rubbish and analyse the frequency of the different types. Create graphs to organise and share this information.

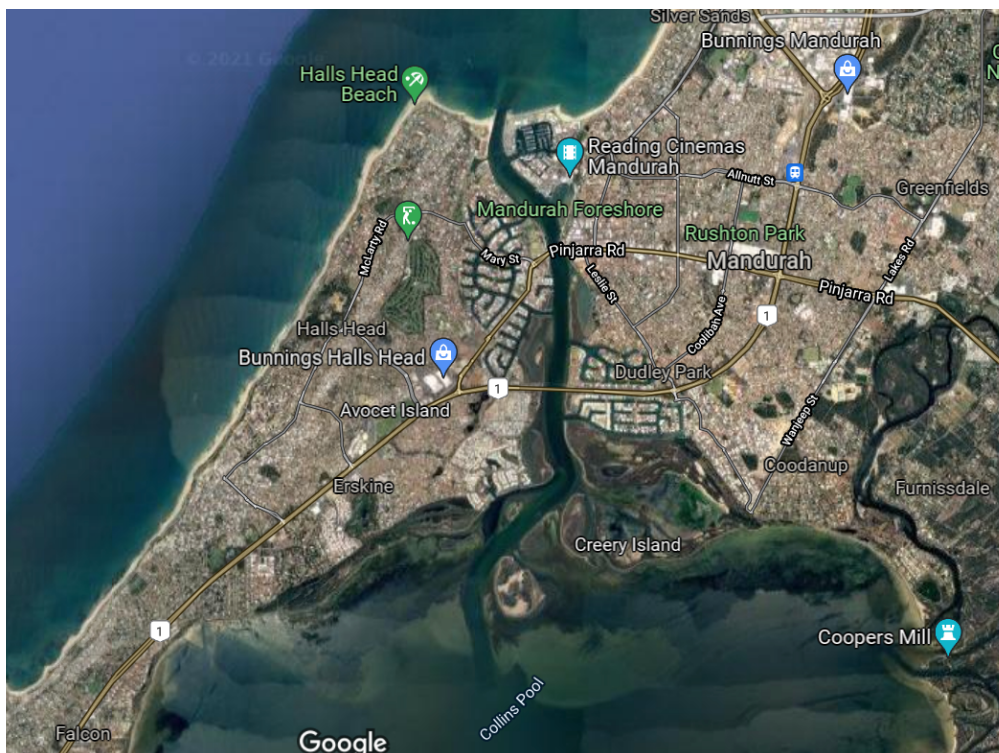# STEP 2 - DISCOVER

Activity 6 - What else what we find?

In teams, have students perform their own mini research project within the school community that relates to their issues.

Our Example: In teams, design a survey to collect data about an environmental issue around school. This may include surveying types of rubbish found, students with waste-free lunches, etc. Have students graph this and teams share their findings.

Activity 7 - Checking with stakeholders and asking questions?

Make a connection with a local organisation that has involvement with your issue. This may be an incursion or Skype call, etc. Using the new information that they present, create further questions about the issue.

Our Example: Incursion from the Mandurah Estuary Guardians to discuss the work they do protecting the Mandurah dolphins, and the issues that they see within the community that impact the waterways.

Question

1. Please report your experiment, what are the findings (discovery) you get based on the informations from your source and data gathering?
2. What are the facts that you find based on the information given? mention 3 sources, where did you find your facts? This can be a website URL or an article name. Include diagrams or pictures.
3. Talk to experts and lists what are 3 things that they're tell with you about your findings (discovery)?
4. What is the relevant methodology/framework for solving the problem?
5. And how do you separates which one is the fact and opinion? mention 3 sources, where did you find your facts? This can be a website URL or an article name. Include diagrams or pictures.

STEP 3 - DREAM

Summary

Here, you consider **ALL** the possibilities and visions of a solution the way you wish to see it. This is where you share ALL your ideas and use your imagination, creativity.

Details

1. Restate your problem here, and consider if it has changed a little since you started collecting your data and facts.
2. Brainstorm ALL your ideas onto a page, the more solutions you can suggest the more creative and exciting.
3. Consider if this issue has been solved previously and if it has where it has been solved previously, describe these situations and consider if these solutions were successful. Consider the evidence to determine if this solution was successful. You might want a diagram or picture here.
4. Imagine the future and you come back here in 20 years consider what you would like this situation to be like and draw a diagram.

- **Generating wishes**

This skill allows students to break all bonds of their thinking, and envision a perfect solution to work backwards from. It encourages students to be fearless in brainstorming and sharing their ideas. Wishing inspires students and invokes a stronger drive towards finding solutions

- **Exploring possibilities and consider what has been done before**

After generating as many ideas on a brainstorm consider where this problem has been solved previously. Go back to the resources and research to fine 1 or 2 places where this issue has been solved previously. How did those stakeholders solve the issue and what happened?

- **Imagining best case scenarios**

Helps students remain inspired towards developing the best possible solution. Encourages revisiting of the brainstorming in generating wishes or creating a new brainstorm. It supports students to have a vision. Focusing on the possibilities teaches students to keep a positive frame of mind when solving problems. Encourages all team students to develops positive and constructive mindsets from team members.

- **Future Thinking**

Consider 20 years into the future what will the context look like solved. Describe this perfect place and consider if solving this problem will be significant.

Example

There are other estuaries around the world where they are dolphins including in QLD and also in Florida in US.
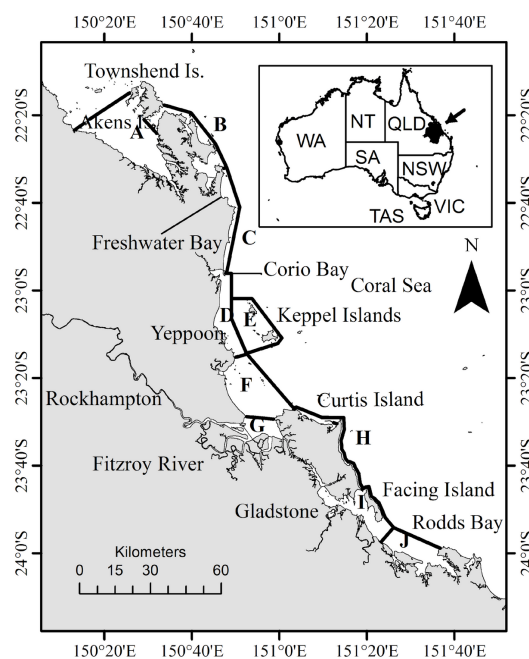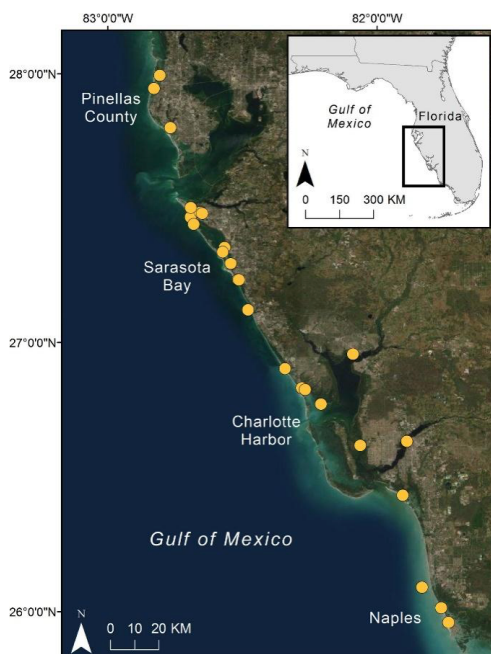
QLD dolphins in the Fitzroy River (https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0056729) although this is not a positive story.

STEP 3 - DREAM

Question

1. What is the problem that you want to solve, restate it here?
2. Write down ALL your ideas (we call this a Brainstorm) here. You might want a diagram or picture here.
3. Where has this issue been solved previously, describe these situations? How it might be happened? as validation for you to solve the problem. You might want a diagram or picture here

STEP 4 - DEVELOP

Summary

This is the workshopping phase where your solution begin to take shape through examining all the ideas that you brainstormed and your team needs to choose 1 idea to take forward and design into a solution.

Details

1. In your group, each person picks out 5 of their favourite ideas that they think are awesome. Then let's see how many you have in common and these are the ones that you will focus on. Remember focus on solving the problem and not each person's favourite solution.
2. Focus on the top solution for each person, can the person explain why they liked this solution and how they can see it. Make sure everyone in the team contributes to the PMI of each of the final solution ideas.
3. You now have to negotiate in your group and pick one solution that you think you can create and implement as a team. Complete a detailed PMI and then use the information in the improvement phase to create your solution.
4. Describe your solution in words or in a short video and/or draw your solution with labels. Add as much detail to the design as you can so in the next stage you can develop and deliver your solution.

- **A clear idea of how to begin**

Proceeding with clear focus keeps everyone aligned towards the end goal and it fosters the collaborative spirit by making sure everyone looks out for each other. Ensure each team members gets to have input and make suggestions at this point. Having a plan of action inspires confidence in yourself and team members in achieving the goal and it introduces structure, and a clear strategy for progression in problem solving and project management.

STEP 4 - DEVELOP

- **Creating instructions**

Instruction writing is a good communication practice for explaining the logical steps to a task. It helps us to consider the viewpoints of others as we create a set of instructions that can be broadly understood. This skill also works to develop logical patterns of thinking. You as the teacher may need to create some characteristics and progression sheet to help students to think through their solutions and find the best one using consensus.

Example

Positive	Minus	Improvement
What was the positive aspects of this idea	What will be problematic about this	How can we improve the design of the solution?

Question

1. Please ask the group to write down, what are the 5 favourite ideas as they like and focused on?
2. Please find out how many participants in your group voted for their favorite idea and thought it was fantastic?
3. Find out how to provide the best solution for everyone? and categorizing & prioritize Positive, Minus and Improvement (PMI) on each person. Check that if everyone on the team participates in the PMI of each final solution proposal
4. Negotiate with your group and pick which solution chosen that you believe you can find and implement as a group?
5. What are the design details can you suggest to your group?, so that at a later stage you can develop and deliver your solution.

STEP 5 - DELIVER

Summary

In this phase, there are two separate components—Produce and Present. This involves the action for completing the product and presenting the proposed solution.

Details

Now you will produce the solution as a team and see if it is successful.

1. What is your solution and how will it work to solve the problem?
2. Can it be tested?
3. If you have tested the solution, what are your success indicators (how do you know it is successful?
4. How will you present your solution to your audience and your stakeholders? What tool with you use. Please share details here.

Teacher Details

- **Create the product prototype**

Sometimes the product can be completely created, other times it can be a prototype which might mean it is a single version to trail or a cut down version or even a drawing of what the prototype will look like once created. Whilst what would be the best to create an actual 'working' prototype to trail with the stakeholders it will depend on the time constraints and the capacity of the students and the solution.

- **Refining the Idea**

Give student a chance to revisit other stages of Solution Fluency to refine and improve their solution. Presenting solution raises questions from both students and their audience as to what works and what could be improved.

STEP 5 - DELIVER

- **Identifying the appropriate format for presentation**

Presenting a solution helps students learn about how new technologies work, and how they can be used in classroom projects. Students learn to focus on the message and how it shapes people's thinking. Guides students towards considering what they really want to accomplish with any message you want to share. Students learn to become interested in others by getting to know about the audience beforehand, hopefully these are the stakeholders.

Question

1. Have you tested/validated your solution by applying it to the problem at hand?
2. Have you summarized all the questions from the audience after you presented your solution? This is useful for feedback to solve problems.
3. How do you visually and best design a solution, which is critical to the success of your stakeholders & users?
4. What are your indicators of success (how do you know it can work?
5. How do you prepare & present your solution to stakeholders?
6. How can you convince them to believe in your ideas?

STEP 6: DEBRIEF

Summary
The reflection stage where students get to own their learning. They look at the ways they succeeded, and ways they could improve their approach in similar future situations.

Details
1. What was the problem and how has your solution solved this problem in this situation (we call as context) and consider the strong positives of your solution (write a list). Write down some of the issues that you have detected in your solution (write a list). Review the stages of the PBL that you completed, and which was the most challenging stage and why (Define, Discover, Dream, Develop, Deliver, Debrief).
2. What was the best aspect of the project experience (for example working with your friends or ….) and then draw or describe improvements to your solution based on conversations with your peers and others.

Teacher Details
- **Revisiting and reflecting on the product/process**

It sets the tone for a lengthier discussion about how the 6Ds were utilized in creating the solution to the challenge. Students learn more about "big picture" thinking and broader perspectives It develops collaborative communication skills.

- **Asking good questions about the product/process**

Asking questions reveals what students can improve on when addressing similar problems in the future. Students can learn to improve processes to make them more versatile. It continues the development of collaborative skills when working in teams It allows students to recognize the specific contributions of each team member.

- **Internalizing and utilizing new learning**

Problem solving becomes easier with an internalized process like the 6Ds Students begin to see problems as opportunities for greater learning.

Example

Marking key for teachers to review the project. Dolphins in the Mandurah Estuary.

Including Assessment (Wabisabi Learning, 2019).

Question

1. How can you explain your whole problem contextually? (Correlating real-world case studies with various relevant theories/methodologies/frameworks)?
2. What are the strengths, weaknesses, threats and future opportunities of your solution? (in terms of internal & external).
3. Consider all of the PBL stages you completed, and which stages were the most challenging and why:

– Define?

– Find?

– Imagining?

– Designing?

– Deliver?

– Debrief?

1. What successes can you see after testing your solution with users and stakeholders?
2. What are the things that need to be changed?
3. What are the biggest questions going forward regarding solution development?
4. Are there any new retrospective ideas to discover based on stakeholder or audience feedback?