PROBLEM BASED LEARNING IN MATHEMATICS

BLACKWOOD HIGH SCHOOL

Traditional Learning

Told what we need to know → Memorize it → Problem assigned to illustrate how to use it

Problem-Based Learning

Problem Assigned → Identify what we need to know → Learn & apply to solve the problem

PROBLEM BASED LEARNING

- WOMBATS
- PELICANS
- HAIGHS CHOLCOLATE
- COOLING CUPS
- SOLAR PANELS

PROBLEM BASED LEARNING

- WOMBATS

ISSUE: WOMBATS WERE PROPOSING THREATS ON FARM LAND AND THEIR CROPS.

HOW MANY WOMBATS ARE THERE IN AN AREA? (ESTIMATION)

MANAGEMENT PLAN TO CULL WOMBATS.

DESIGN A REMOTE CONTROL CAMERA CAR TO IDENTIFY WOMBATS

BURROWS AND THEIR ACTIVITY WITHIN.

MURRAYLANDS INVESTIGATION

GROUP WORK PROPOSAL

PROBLEM BASED LEARNING

- WOMBATS

PROBLEM BASED LEARNING

- PELICANS

ISSUE: A COLONY OF PELICANS ARE LIVING ON AN ISLAND 700M OF PT ADELAIDE.

AN ANALYSIS OF THEIR POO SHOWS THEY ARE FEEDING ON FRESH WATER FISH.

FLINDERS SCIENTISTS WANT TO INVESTIGATE WHERE THE FISH ARE COMING FROM.

PROBLEM BASED LEARNING

- HAIGHS CHOLCOLATE

ISSUE: WANTED TO CREATE A NEW CHOCOLATE THAT INCLUDED MARSHMALLOWS.

STUDENTS TO PRODUCE A CONFECTIONARY PRODUCT THAT IS SUITABLE FOR THE YOUTH MARKET.

THE PRODUCT MUST BE PACKAGED AND LABELLED IN LINE WITH FOOD STANDARDS AUSTRALIA NEW ZEALAND (FSANZ.)

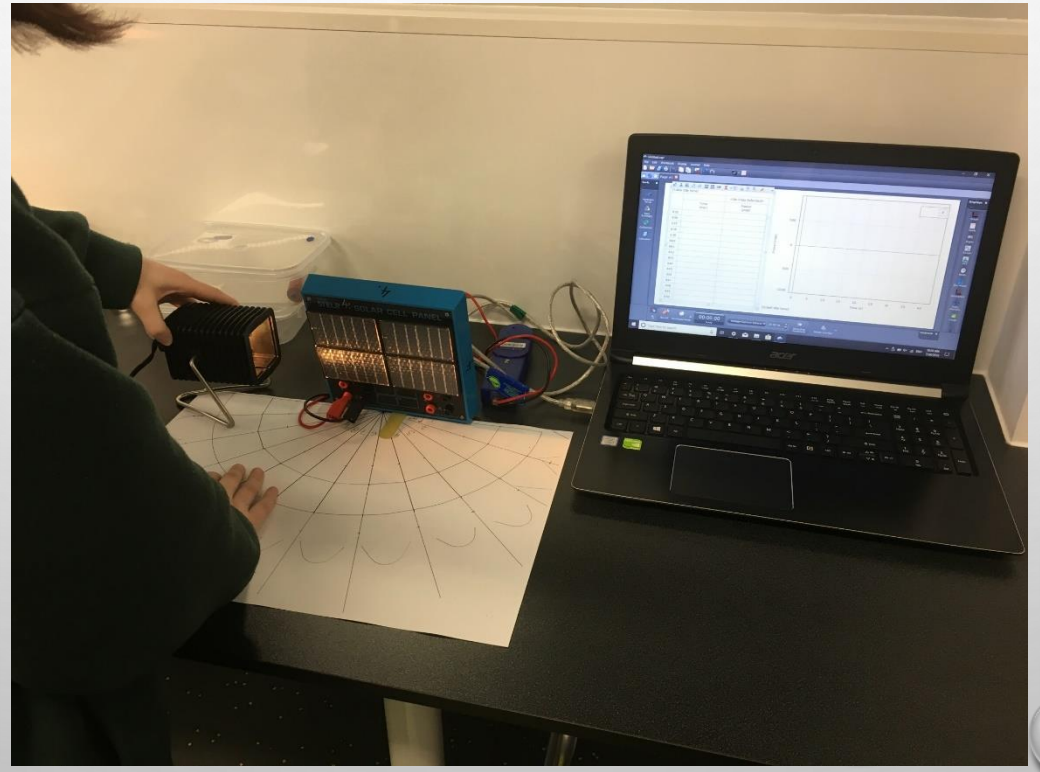
PACKAGING TO BE SUITABLE FOR PURPOSE USING FOOD SAFE MATERIALS.

PRODUCT IS TO BE PRESENTED AS A FINISHED PRODUCT COMPLETE WITH MARKETING STRATEGY.

PROBLEM BASED LEARNING

- SOLAR PANELS

ISSUE: HOW CAN YOU USE REAL LIFE DATA TO CREATE STATISTICS?



PROBLEM BASED LEARNING

- COOLING CUPS

ISSUE: A COFFEE SHOP WANTS YOU TO DESIGN A DISPOSABLE CUP HOLDER FOR A SIMPLE GLASS CUP.

THE PROCESS

- DEFINE THE PROBLEM – WHAT DO WE WANT TO ACHIEVE?
- STUDENTS SET THEIR OWN CRITERIA AND PARAMETERS
- EXPERIMENT AND PROTOTYPE
- TEST, REFINE AND FINALIZE
- REPORT ON YOUR THINKING

THE TASK

- A COFFEE SHOP WANTS YOU TO DESIGN A DISPOSABLE CUP HOLDER FOR A SIMPLE GLASS CUP. THE REASON FOR USING GLASS CUPS IS THE ABILITY TO STACK THE GLASSES WHICH LEADS TO LESS STORAGE SPACE AND THE TABLES BEING CLEARED MORE EFFICIENTLY. ALSO, SIMPLE CUPS ARE EASY TO LOAD INTO THE DISHWASHERS AND MAKE CLEANING EASY.

THE PROTOTYPE

- DISCUSS OR HAVE STUDENTS BRAINSTORM WHAT PROPERTIES THEIR HOLDER NEEDS TO HAVE – HOW IT WILL FIT, CAN BE HELD EASILY, NOT TOO THICK BUT THICK ENOUGH TO INSULATE, MUST BE STABLE TO PREVENT SPILLAGE
- START TO CREATE USING TRIAL AND ERROR

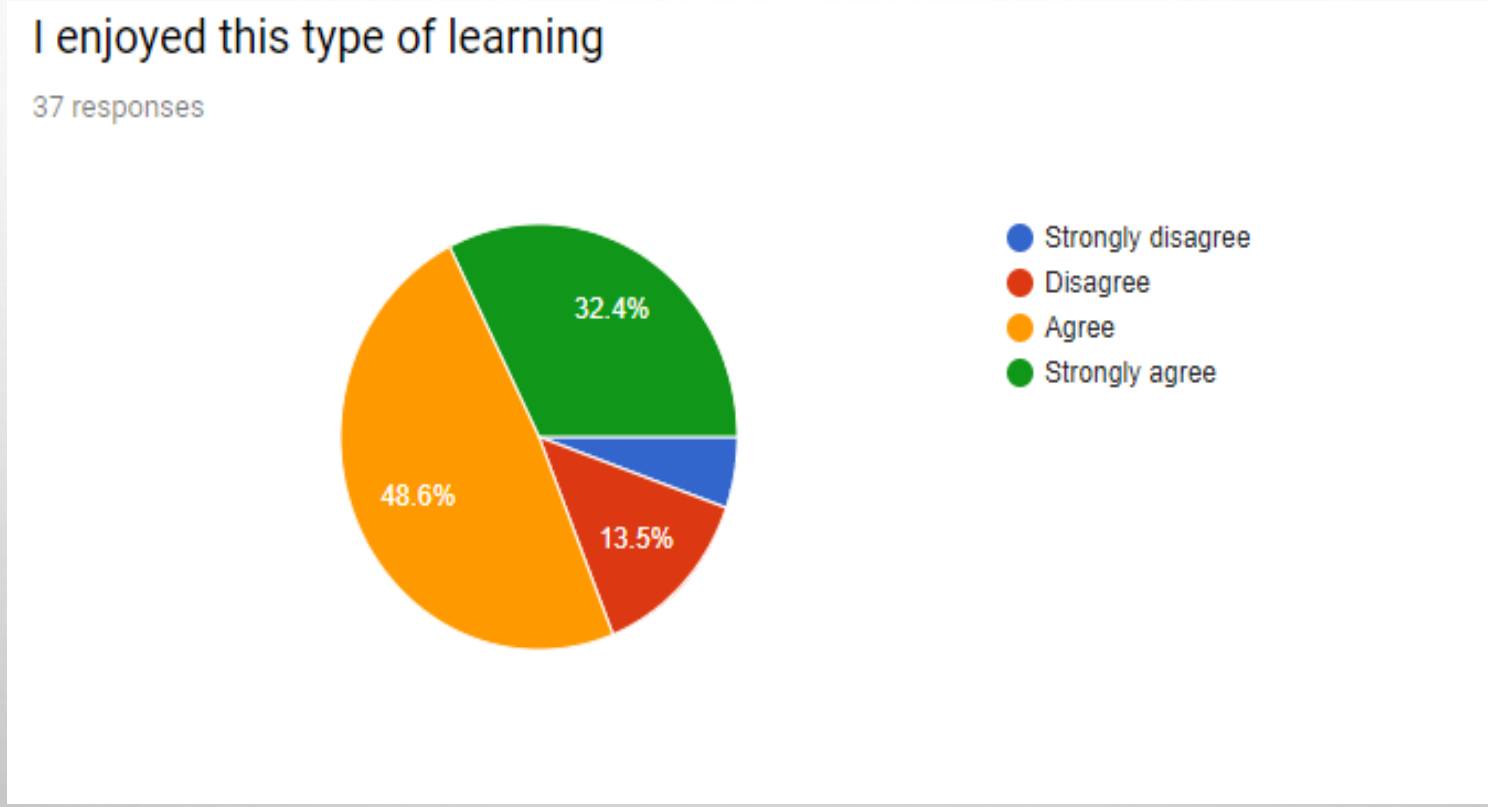
KEY QUESTIONS

- RATHER THAN SHOWING STUDENTS WHAT TO DO, ASKING KEY QUESTIONS WILL STIMULATE THEIR THINKING AND ENCOURAGE THEM TO SOLVE THE PROBLEM THEMSELVES
- EXAMPLES OF KEY QUESTIONS MIGHT BE:
  - HOW DO YOU DECIDE ON RATE OF CURVATURE?
  - HOW DO YOU FIND THE LENGTH OF ARC NEEDED FOR THE BAND?
  - IS IT BETTER TO HAVE A STRIP THAT IS NOT RECTANGULAR AND FOLD THIS STRIP TO MAKE A CRIMPED INSULATION THAT BETTER WRAPS A CUP?
  - HOW DO YOU FIND AREA OF CRIMPED INSULATION STRIP? IS IT BEST TO DO BEFORE FOLDING?

THE REPORT

- DESCRIPTION OF WHAT THEY DID AND WHY WITH AN IMPORTANCE ON WHERE THEY HIT HURDLES AND WHAT THEY DID TO OVERCOME THEM
- A DETAILED QUOTE FOR THE COFFEE SHOP THAT SHOWS COSTS, CALCULATIONS AND A BLURB TO CONVINCE THE OWNER TO USE THEIR PRODUCT

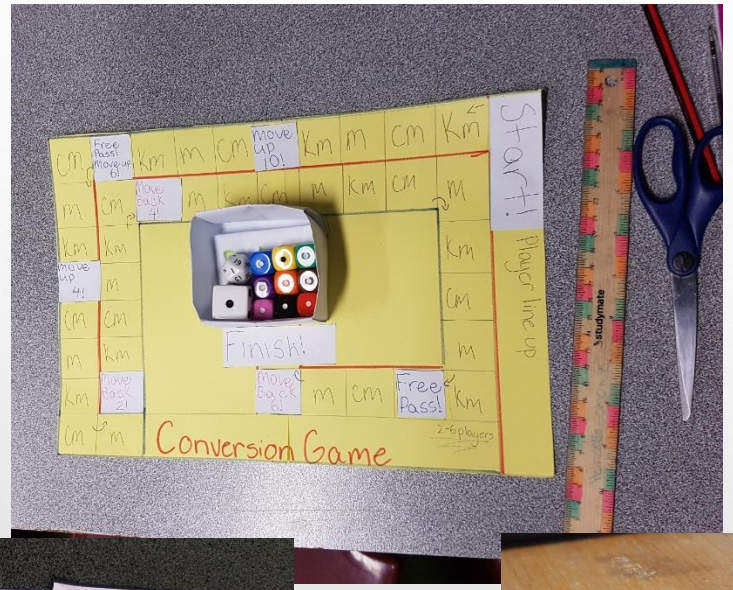
FEEDBACK

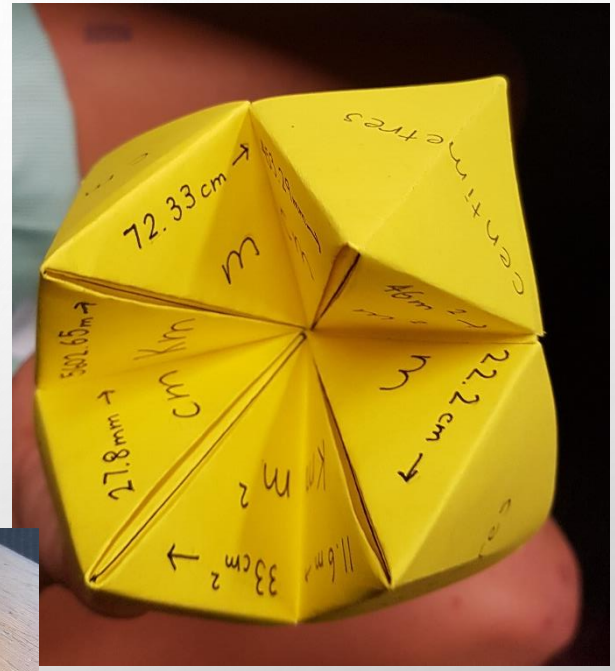

I enjoyed this type of learning
37 responses
32.4%
48.6%
13.5%
Strongly disagree
Disagree
Agree
Strongly agree

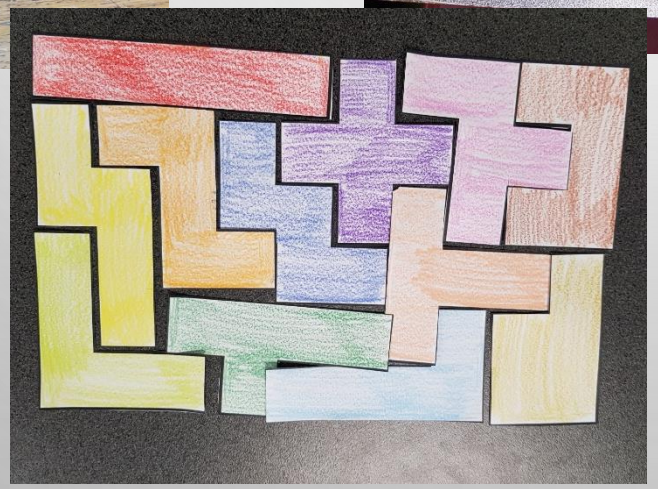
FEEDBACK

- “I LEARNT THAT WHEN CREATING A PRODUCT, SUCH AS THE ONE WE JUST DID, IT TAKES A LOT OF THOUGHT AND EFFORT TO CREATE THE THING ITSELF. THERE IS A LOT OF PROBLEM SOLVING AS WELL.”
- “I DON'T THINK THERE COULD BE ANYTHING IMPROVED WITH THIS PROJECT. THIS PROJECT WAS EDUCATIONAL AND FUN.”

MORE PROBLEM BASED LEARNING







PROBLEM BASED LEARNING

- USED FACULTY TIME TO WORK IN A TEAM TO CREATE PROBLEM BASED LEARNING LESSONS/UNITS
- YEAR 8 – COOLING CUPS
- YEAR 9 – SOLAR ENERGY
- YEAR 10 – WOMBATS / PELICANS
- TERM 4 – FACULTY WILL DEVELOP OUR NEXT PROBLEM BASED LEARNING ACTIVITIES
- IMBEDDED INTO EVERY TERM MATHEMATICS
- WHERE DO WE SEE PROBLEM BASED LEARNING IN SACE?