Project Based Learning in Digital Solutions

Thea Koutsoukis KGSC

Presentation Plan

- Intro
- What is PBL?
- Why PBL?
- Planning a project
- My Project
- Challenges
- Takeaways
- Resources

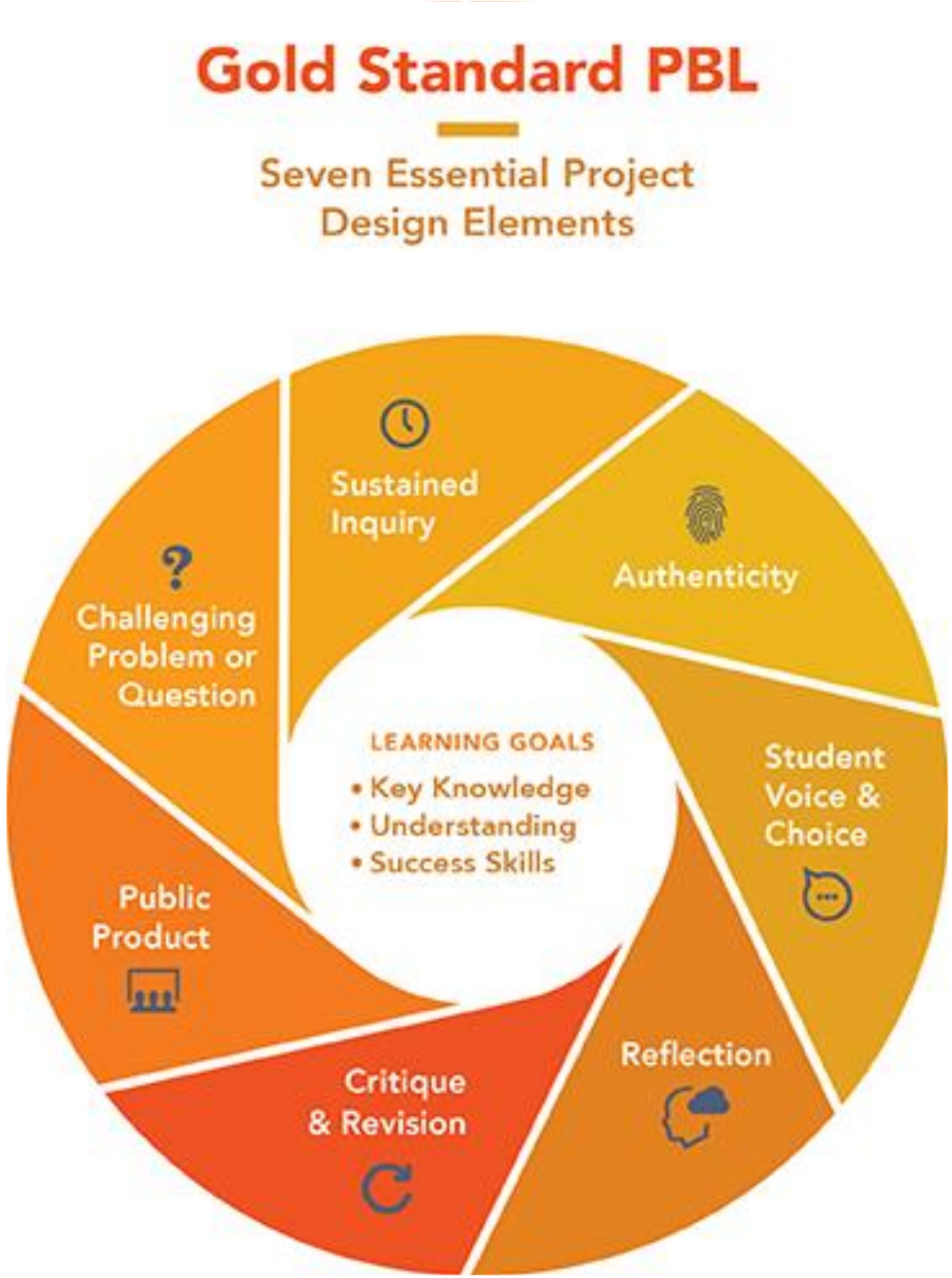
Introduction

- Thea Koutsoukis (kt-soo-ks)
- Digital Technologies, Digital Solutions, ICT & Maths
- Background in Artificial Intelligence & Computer Science
- Worked as a software developer before teaching
- Favourite languages are Python & Haskell
- Just getting started on my PBL journey!

What is PBL?

- PBL = Project Based Learning
- Students learn by engaging in real-world meaningful projects
- Work over extended period of time
- Create a public product for a real audience

What makes a PBL unit?



DESSERT
"DOING A PROJECT"

OR

MAIN COURSE
PROJECT BASED LEARNING

DESSERT "DOING A PROJECT"	MAIN COURSE PROJECT BASED LEARNING
An add-on to the traditional instruction; at the end (or alongside) of the unit	Instruction integrated into the project (The project is the unit!)
Follows direction of the teacher	Driven by student inquiry
Focused on product	Focused on product and process
Often unrelated to standards and skills	Aligned to academic standards and success skills
Can be completed alone and/or at home	Involves collaboration with students and in-class guidance from teacher
Remains within the school world	Has a real-world context and application
End result of project displayed in the classroom	Results of project shared beyond the classroom with a public audience

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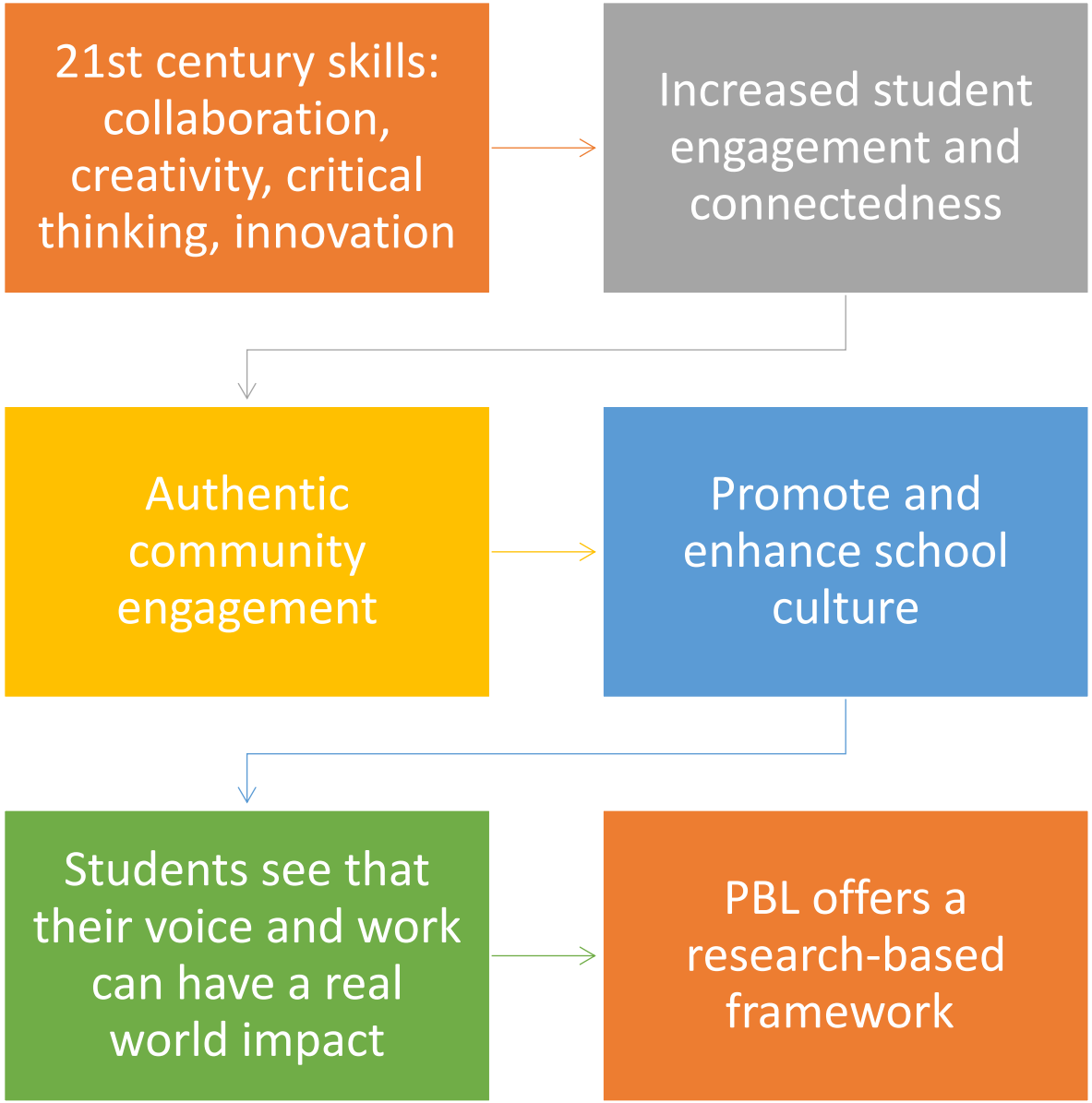
Why PBL?


21st century skills: collaboration, creativity, critical thinking, innovation
Increased student engagement and connectedness
Authentic community engagement
Promote and enhance school culture
Students see that their voice and work can have a real world impact
PBL offers a research-based framework

PBL in senior??

Perfect fit!

Already creating a product

Digital solutions is very broad

- Plenty of scope for student voice & choice

Planning your project

Develop a project idea

Write a driving question

Launch -> Build Knowledge -> Develop -> Present

Project Ideas

DOES THE PROJECT MEET THESE CRITERIA?			?
KEY KNOWLEDGE, UNDERSTANDING, AND SUCCESS SKILLS The project is focused on teaching students key knowledge and understanding derived from standards, and success skills including critical thinking/problem solving, collaboration, and self-management.			
CHALLENGING PROBLEM OR QUESTION The project is based on a meaningful problem to solve or a question to answer, at the appropriate level of challenge for students, which is operationalized by an open-ended, engaging driving question.			
SUSTAINED INQUIRY The project involves an active, in-depth process over time, in which students generate questions, find and use resources, ask further questions, and develop their own answers.			
AUTHENTICITY The project has a real-world context, uses real-world processes, tools, and quality standards, makes a real impact, and/or is connected to students' own concerns, interests, and identities.			
STUDENT VOICE & CHOICE The project allows students to make some choices about the products they create, how they work, and how they use their time, guided by the teacher and depending on their age and PBL experience.			
REFLECTION The project provides opportunities for students to reflect on what and how they are learning, and on the project's design and implementation.			
CRITIQUE & REVISION The project includes processes for students to give and receive feedback on their work, in order to revise their ideas and products or conduct further inquiry.			
PUBLIC PRODUCT The project requires students to demonstrate what they learn by creating a product that is presented or offered to people beyond the classroom.			

Effective driving question

- Engaging for students
  - Suitable for age, demographic, community
  - Provokes students to ask questions
- Open-ended
  - Answer is unique and complex – not “google-able”
  - Several possible “right answers”
- Aligned with learning goals

Launch Event

- Excursion
- Guest Speaker
- Film, Video, Website
- Simulation/role-play activity
- Startling statistics
- Song, poem, art
- Live discussion
- HACKATHON!

My Project

2016

participated in HealthHack BNE

2019

joined “PBL Hive”

2020

school connected with Royal Brisbane Women’s Hospital

"We use technology to help people lead healthier lives!"

CSIRO

HealthHack

How can we use technology to promote good health and well-being?

"Technology plays a vital role in the health of all Australians. From managing health information digitally to advances in gene technology"

Australian Government
Department of Health

Year 11 Digital Solutions

Kelvin Grove State College

STATE COLLEGE
WITH ALL THY MIGHT

INVESTIGATE AND EXPLORE

Using the problem-solving process, students will

- Understand the nature of data-driven health problems including user requirements, programming options and problems associated with data management
- Explore the personal, social and economic impacts of storing health related data
- Recognise and describe useability principles and the elements and principles of visual communication
- Analyse and structure data to reduce redundancy and ensure consistency and integrity
- Generate a prototype digital solution to access, manipulate and display data in a website
- Test and evaluate code, user interfaces and digital solutions

DIGITAL SOLUTIONS UNIT 2 OBJECTIVES

1. Recognise and describe programming elements, data and useability principles, and data management processes
2. Symbolise and explain information, ideas and data flow relationships within and between systems related to programming problems
3. Analyse problems and information related to the selected technology context
4. Determine solution requirements and prescribed and self-determined criteria of a programming problem
5. Synthesis information and ideas to determine possible digital solutions
6. Generate user interface and programmed components of the prototype digital solution
7. Evaluate impacts, components and solutions against criteria to make refinements and justified recommendations
8. Make decision about and use mode-appropriate features, language and conventions for particular purposes and contexts

UN SUSTAINABLE DEVELOPMENT GOAL

21ST CENTURY SKILLS

Critical thinking | Creative thinking | Communication | Personal and social skills | Information and communication technology skills | Collaboration and teamwork

This unit follows the project-based learning (PBL) framework:

CREATE

Students will

- Explore problems that medical professionals face and choose an issue that interests them
- Develop a web application using the Python Flask web framework, HTML and CSS and an SQLite database backend
- Work with industry professionals to get feedback and make revisions
- Publish their web application with an open-source licence, encouraging further development and collaboration with people around the world

EVENTS

Entry Event—KGSC Hack for Health

Thursday 13th May

9:00am - 12:00pm

The KGSC Hack for Health will bring together student developers, healthcare professionals and IT mentors to hear interesting problems and brainstorm innovative solutions! Inspired by events such as the Brisbane HealthHack and MIT Hacking Medicine, we will spend time learning from people with a passion for healthcare and consider how we can utilise technology to help them in their daily lives.

Showcase

Thursday 7th October

10:45pm - 12:00pm

Our young healthcare entrepreneurs will showcase their projects to members of the KG community by presenting a final pitch of their idea. Special judges will award prizes to some well deserving students!

Entry Event

Hackathon – "KGSC Hack for Health"

Invited healthcare professionals to share problems

Students listened, asked questions and brainstormed ideas in groups

Auslan Sign Board

When a Deaf patient visits a hospital, it can be difficult to get an interpreter - particularly in the middle of the night. Hospital staff often have to rely on friends and family to communicate with the patient, particularly if the patient is illiterate or cannot write due to injury or intubation.

Static communication boards such as the one below can be useful for basic communication, but are limited to very simple messages.

A solution would allow both staff and patients to select Auslan phrases from a list developed by speech pathologists to better aid communication when interpreters are not available.

Collecting Personal Info - Oral Health

QLD Oral Health Services provides outreach care for large groups of participants.

Participants are required to complete medical history & consent forms prior to receiving care. Participants must show proof of eligibility e.g. Medicare Card / Pension Card. To receive an appointment for follow up care, patients must call a call centre that requires them to hold for hours.

These are time-consuming and labour intensive.

One strategy is to have participants pre-register. Data could be received a few days prior to the event, allowing staff to schedule events and check eligibility.

A solution would enable

- Consent forms to be completed and returned to an email address
- Patients to attach images of their Medicare cards etc.
- Patients to nominate their preferred clinic and appointment times

Donate a Mole

A melanoma is a type of skin cancer that develops from moles. Melanoma rates continue to increase in Australia - the Australian incidence is 12 times the global average. Melanomas can occur anywhere on the body.

It is unknown whether there are "hotspots" on the body – areas where moles are more likely to grow and turn into melanomas. The exact location of moles and melanoma is not currently being collected.

A web application could be built that allows people to upload

- A photo of a mole
- The location of the mole on the body

to a database that could be used by researchers

Trauma Data Entry

Trauma departments in QLD hospitals currently have over 70 mandatory questions that they must answer on each patient that visits the department. The answers to these questions must be collected from the ambulance, ICU and from patients themselves.

Currently, this data is gathered on paper and manually transferred to a Microsoft Access database. This is time consuming for the doctors and admin staff and is prone to errors.

A web application could contain a single form that connects straight to a database and allows doctors to easily collect the mandated data.

Patient Follow-Up

When patients leave the hospital, there is often several weeks or months before follow up appointments. Patients often have no means of communicating with their doctors in between appointments. This can lead to problems getting worse unnecessarily, as patients wait until seeing their doctor to bring up issues.

An application could be built to allow users to track symptoms and send reports to doctors or surgeons in between visits.

difficult

hand Sign tracking
- updates in real time
putting the live feed
rough hand recognition,
displays sign ton to
nglish and labels the
phrases

Search function
ices - organised clips
rases based on order that
words was searched
request function
- when used it brings
up e-mail template,
requester inputs
needed clips for
database building

eye tracking keyboard
requires specific hardware

- sorts by phrase if
ot found it selects ind-
vidual words and puts
e corresponding clips up

Big Ideas

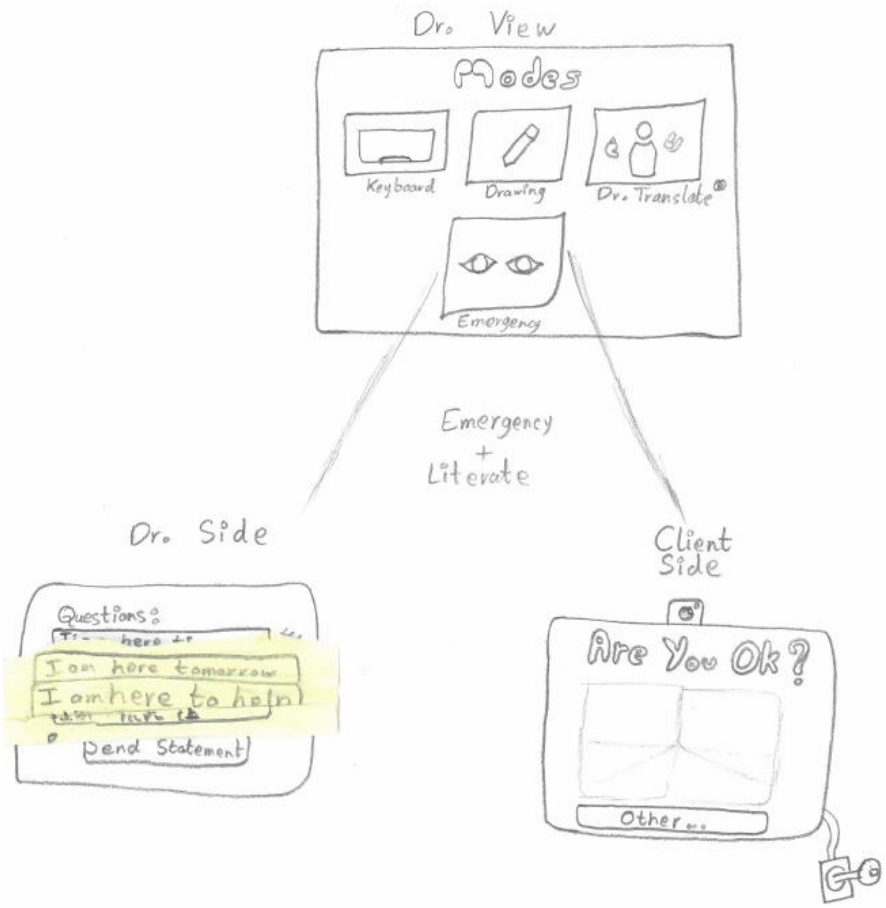
- getting info from patients
and giving to doctors,
post treatment.
- helpful
- getting health
info individually is w

Database

- Low profile
- simple yet detailed UI
- scanning functions for
faster entries

Big Ideas

- database
- Good UI
- Case based
- Doctor specific
- communication tools
- database of signs



Ambulence
- Two step process to call
- Provides medical records
- Links to emergency & jewarlley

Web app
Alerts ← Calendar
Notifications

Common symptoms
- How long?
- Other symptoms
- Level of pain (low, medium, high) with colours of red, orange, green

Patient Follow Up

Journal (survey)
- Pain level
- Emotions
- Excerise, food, water
- Body functions check in
-

Connect to device
- Heart
-

Settings
- Delete
- Customisable
- Profile → records, allergies

Communications (with Ambulance eye)
- Text
- Call, urgent move to ~~current~~ doctor

Backend

Server & Database to store Information from survey

- Plots incoming / Active Patients against previous cases with similar injuries & Previous Cases of theirs

Encryption / Security

Challenges

- Healthcare professionals are BUSY
  - Unable to come to events
  - Cancellations
- COVID
  - Uncertainty over hosting live events
- Time
  - Unit 2 is so short!
  - A lot of content to cover

Teaching

- In Unit 1 had taught Python and made productivity applications using Python + PySimpleGUI

- In Unit 2 switched to a web application context:
  - Taught databases, SQL, data-driven problems
  - Flask (Python web framework) + SQLite + HTML + CSS
  - Git (version control)

- Students encouraged to work together through tutorials
- Lesson starters – discuss health & technology issues

Assessment

- Stimulus made from notes taken during the hackathon
- Students could choose from the 5 different projects
- Individual projects

Showcase Event

- Unfortuantely postponed due to COVID and me not building in enough time to organise
- Happening week 1 next term
- Students showcase work
- Staff, students, healthcare professionals, IT professionals will view & give feedback

- Students have been working on web apps after assessment due

Takeaways

It takes work to organise

Finding experts is the hardest part – reach out to school networks

Aim for 1 – 2 projects a year across all classes

Take inspiration from real-world hackathons

Find like-minded teachers

Very rewarding

Resources

- Unit 2 lesson plans
- Web application tutorials (Flask + SQLite)
- Assessment Task Sheet
- Slide deck
- PBL planning docs