# Data Modelling and Entity RElationship Diagrams

## Visit <http://www.tinyurl.com/GlowCompSci> click on the Higher Folder in Documents and then DataModellingWithERDiagrams. You will need your Glow Login and Password.

## Overview

This activity introduces data modelling using entities, attributes and relationships by recreating part of the data model used by social networking sites. It can also help to explain the difference between an entity and an instance and an attribute and its value.

## Suitable for

Higher Computing Science

## Key concepts

ER design notation, relational database structures and relationships (one-to-one, one-to-many, many-to-many)

## Learning outcomes

* Understand what an entity and an attribute are
* Understand how these are related to instances and values
* Understand what a relationship is and the different types of relationships between different entities
* Understand the purpose of an ER diagram
* Appreciate that ER Diagrams are one way of creating an information model

## Success criteria

* Given some example attributes be able to group them with particular entities
* Given a set of values group them into specific instances of an entity.
* Given a set of entities describe the relationship between them.
* Define what the terms entity, attribute and relationship mean.
* Create a simple ER Diagram given a set of structured data.

## Time required

1 period

## Preparation

1. Print 1 set of Pupil Handouts A4 Single Sided on card per group of four. Slice these up to form a generic set of cards and a concrete set of cards (These can be stored and reused in future years)
2. Open up Data Modelling with ER Diagrams slides

## Prior learning assumed

Pupils should be familiar with social networking sites such as facebook and have done some work with structured data using some form of database management system.

# Outline of Activity

Pupils will analyse social networking sites they use and identify the kinds of information that can be found on them. They will then group different pieces of information into collections (entities) and then think about how they are related to each other. They will then be able to create an ER diagram showing the relationships between them.

Introduction

Outline the learning intentions and success criteria for this activity and mention that this activity will give them the skills to think about and describe structured collections of data. Most large websites and applications have complicated data models that model how things in the real world are related to each other.

**5 mins**

## Activity 1:- Understanding Social Networking Sites

Ask pupils to give you examples of “the ***kinds of things*** that are on Facebook”.

* perhaps give an example, if they’re slow coming forward - “posts”
* write these on a flipchart/board
* don’t structure or categorise in any way

Discussion:

* There is a lot of data on Facebook.
  + 1.3 billion users
  + 80 billion items shared every month (pictures, posts, notes, news, events, etc),
  + Average user creates 100 items per month

*Question* “How can FB give me back ***my*** data out of the several trillion items out there?! How can the data be structured to support that?”

*Answer* The data is organized to make it easy for facebook to find things.

## Activity 2:- Thinking about Entities and Related Attributes

Give out the **generic card** set for the four FB entities and their attributes

The task:

* Tell pupils that “The ***grey/bold*** cards were some kinds of things that were mentioned in the discussion.” Ask them to arrange the grey/bold cards in a row at the top of the desk.
* Tell pupils that that “The ***white*** ones are some other data items that were mentioned or that you’ll see are connected to FB.”
* Tell them to “Place each white card under the grey/bold card that it is best associated with.”
* Pupils should make a list of attributes that describe the thing (entity) on the grey/bold card. Different groups can arrange these in different ways, as many attributes may apply to many entities.

Discussion:

* Invite the pupils to comment on how they arranged their cards.

Define new concepts:

* The things (grey/bold cards) are ***entities***
* The other data items (white cards) are ***attributes*** that *describe* these ‘things’.
* Deciding which attributes belong to which entities is the beginning of a ***data model***.

## Activity 3:- Using Example Instances and Values

We’re now going to use the **concrete card** set, getting the pupils to structure the pile of real data items in the card set according to the data model introduced earlier.

The task:

* Give them a copy of the **entities** (grey/bold), to remind them of the four kinds of things.
* Now we want pupils to create **instances** of each entity by grouping together related values that describe that instance.
* They do this by forming the concrete cards into groups, where each group is the collection of data for a single instance - e.g. of a Person, a Post, and so on.

Discussion:

*Question* What was easy or hard about this activity?

*Answer* This will depend on the pupils you have

*Question* What is the difference between an **entities** and **attributes** and **instances** and **values**?

*Answer* The entity and its attributes form a pattern or template for each instance with its values.

*Question* What is missing? What did we talk about when we discussed social networks at the start that is not represented in all this information?

*Answer* ***Relationships*** - likes, friended, holds (an event), loaded (a picture), etc.

## Activity 4:- Relationships

We will now use ***specific examples*** of entities to allow pupils to explore the relationships between them.

The task.

* You should ask the pupils to draw relationships as many relationships between the instances on both sheets as they can think of.

Discussion:

*Question* What do you notice about the relationships on both sheets?

*Answer* The relationships are very similar/identical

* Now give a copy of just the entities and ask them to draw relationships and label them. This is called an Entity Relationship diagram.

# Suggested follow up work

Extend the existing example

* Consider further entities, e.g. page, album, group. How do these fit into the pupils’ ER diagram?
* Consider whether each relationship is a one to one, one to many, etc.

Explore the data model of another website such as IMDB, Amazon, Boohoo.com, EasyJet, etc

# Acknowledgements and Copyright

This idea and associated resources were developed by

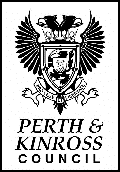


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