Finding, Analysing, Dissecting and Summarising a Research Paper

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Introduction

- To start off!
- Finding your research papers
- The hierarchy of research papers
- Deciding very quickly whether they are relevant in terms of:
  - Qualitative/Quantitative
  - Is it primary or secondary?
  - What methodology is utilised?
  - What is the research design?
  - Is the paper empirical or discussional?
  - Are there participants?
  - What are the research questions?
  - What are the results?
  - What are the limitations?
  - What analysis techniques are used?

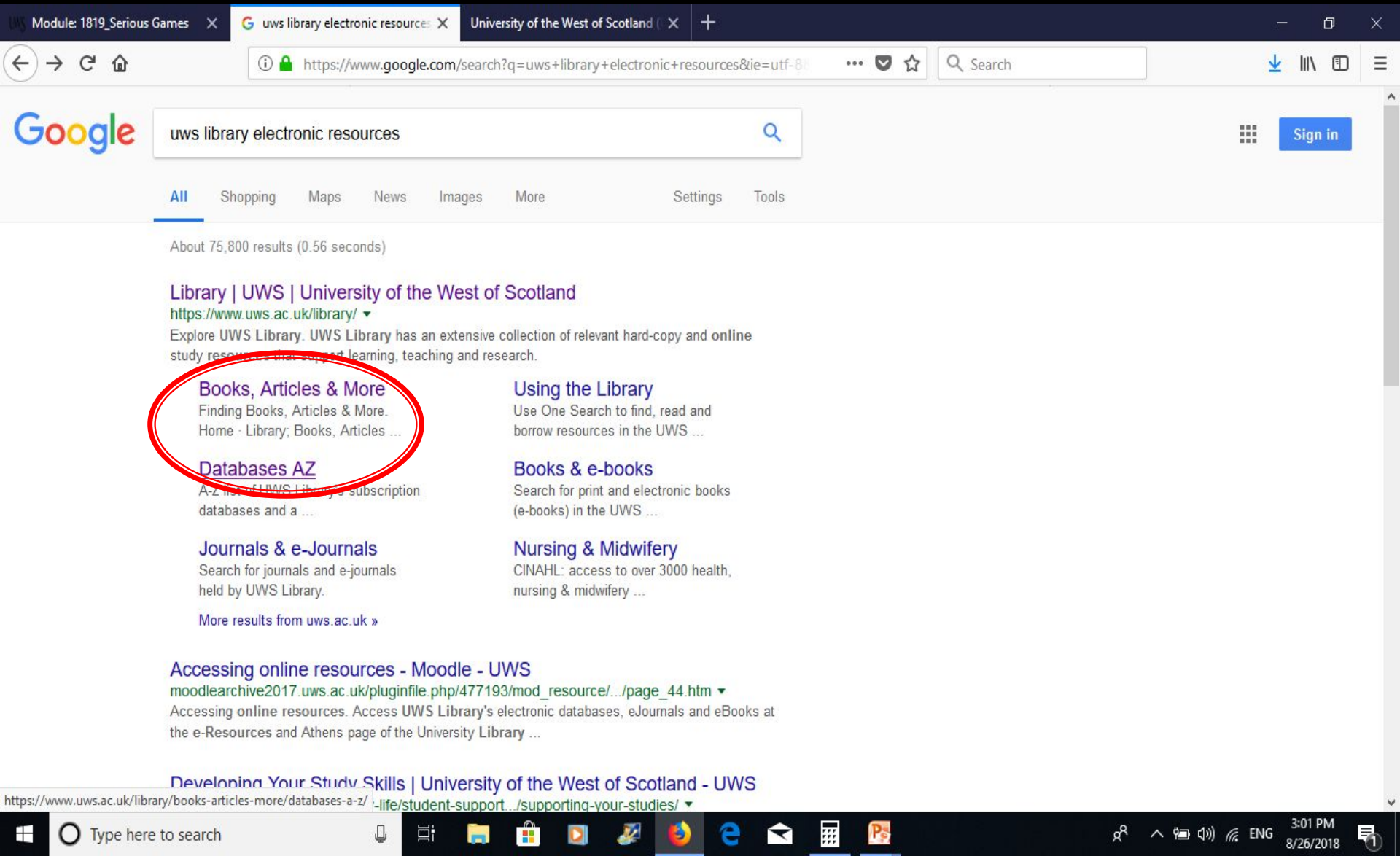
To start off

- You can find yourself lost in a sea of information and it is overwhelming
  - Academics forget what it is like to be so bombarded and confused
  - You can't read and process everything
- Just because something has been accepted as an academic article does not mean by any stretch of the imagination that it is perfect
  - I can personally attest to this
- You are allowed to be critical
  - In fact it is expected at honours level, masters level and PhD level
- Your opinion actually does matter
  - Has all the more power if it is objective, educated and delivered free of emotional disruption

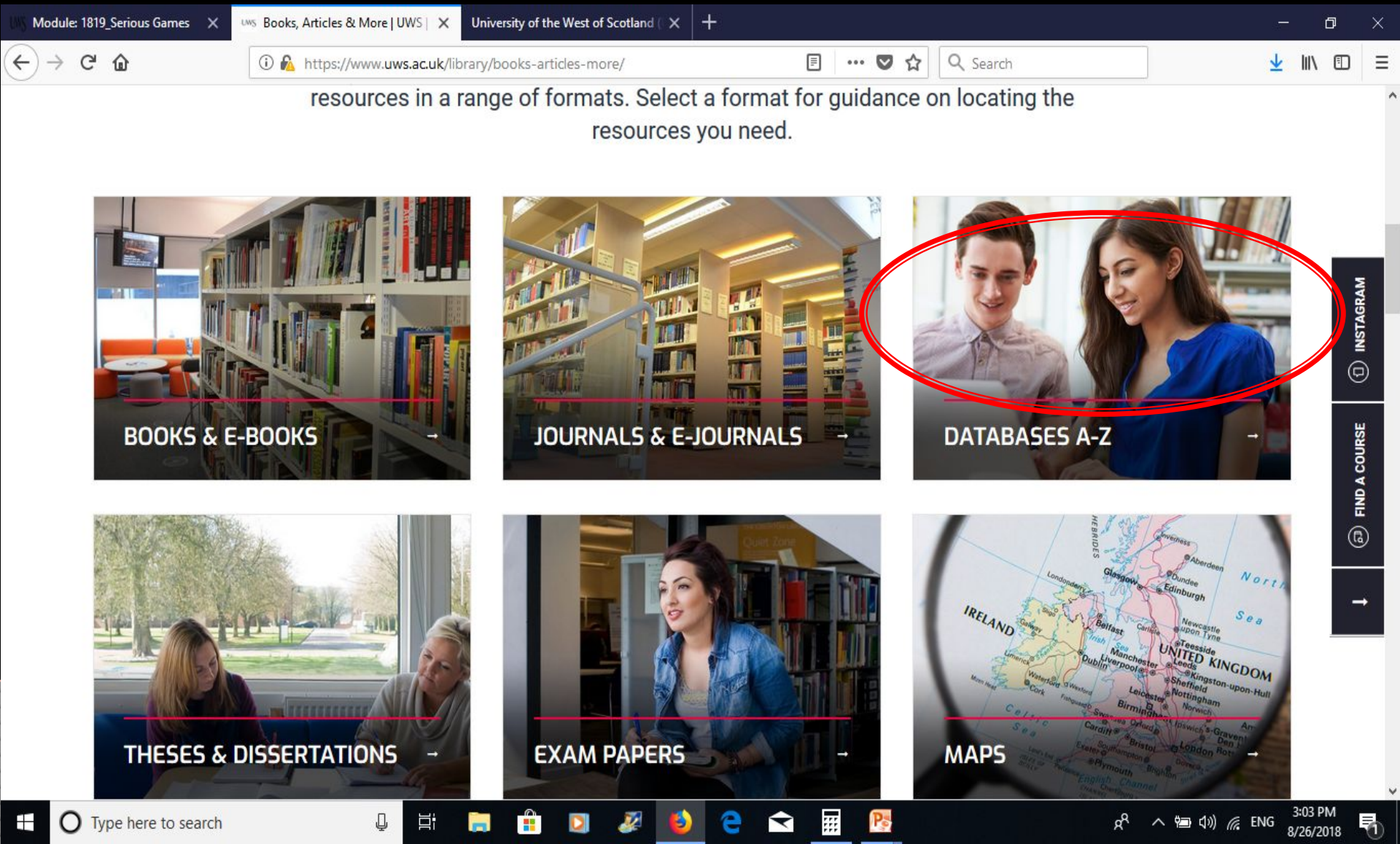
Finding your research papers

- Firstly you have to be aware that you have access to all of the electronic journals that UWS has the access to
  - This is done through the library website
  - It is the first hit when you Google the following: "UWS library electronic resources"

Finding your research papers



Finding your research papers



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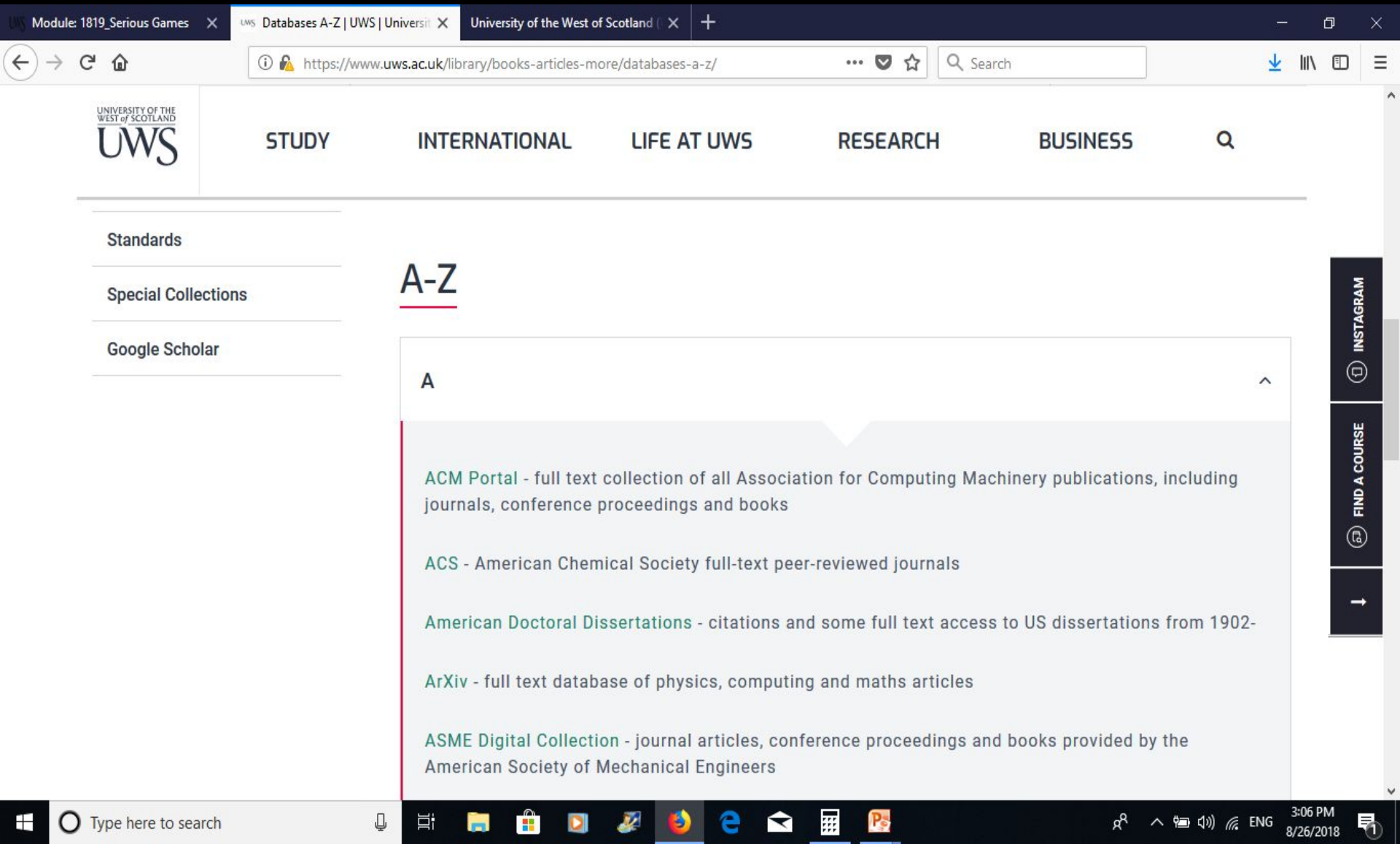


Finding your research papers

- You will get a huge alphabetised list of all of the electronic journals that UWS has access to
  - These are probably the ones that are most relevant

    ACM Portal, BioMed Central, Cambridge Core, EBSCO, Edinburgh University Press, Emerald, Education Resource Information Centre (ERIC), EthOS, IEEE Xplore Digital Library, Ingenta Connect, Oxford University Press, PsycARTICLES, PsycBOOKS, Psychology and Behavioural Science Collection, SAGE Journals Online, ScienceDirect, SocINDEX, Springerlink, Wiley Online Library
- Probably most relevant for games but not an exhaustive list
  - E.g. ArXiv: full text database of physics, computing and maths articles – CGT
  - British Library Sounds – Music Technology

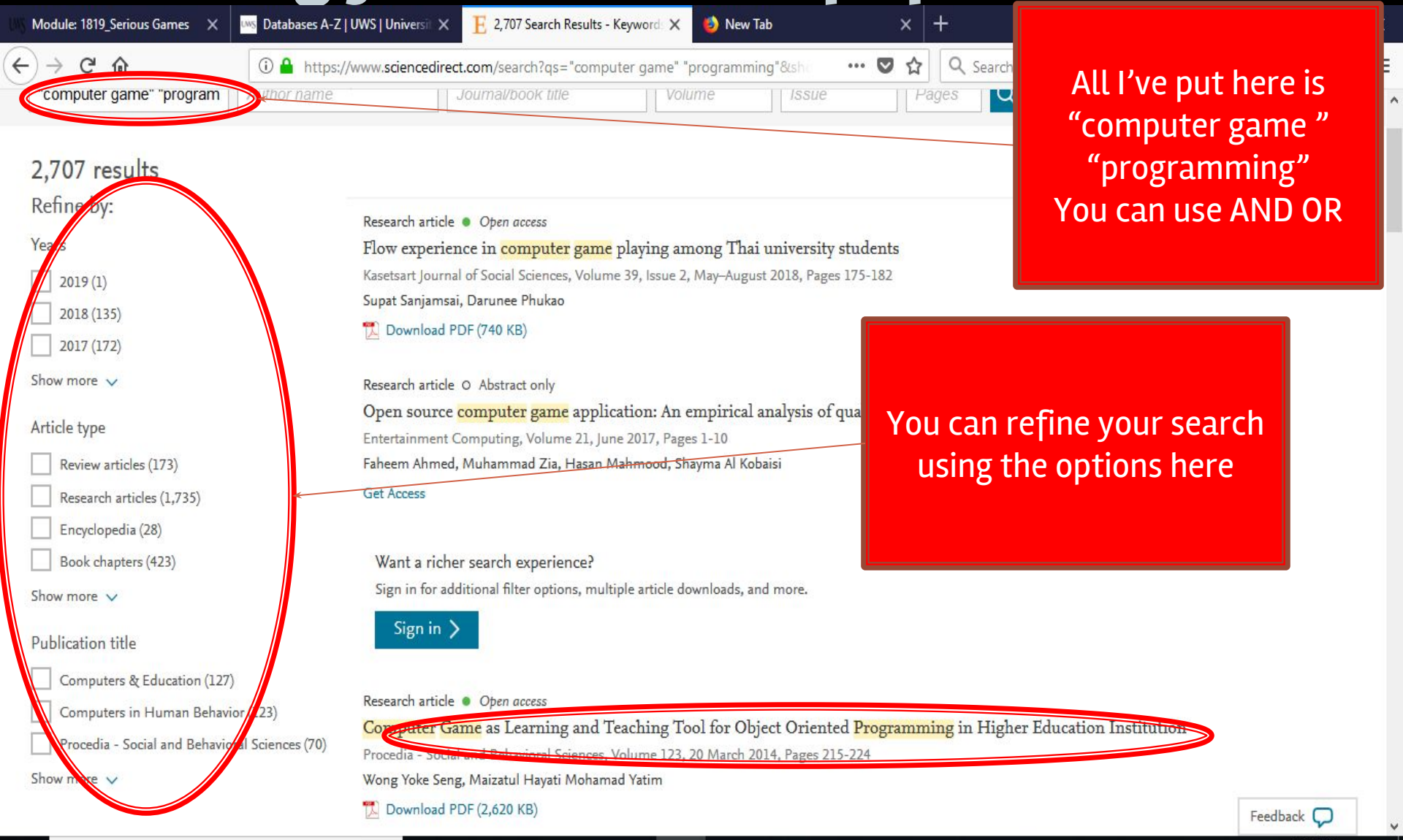
Finding your research papers

- Each journal has it's own search facilities but sometimes you can put together some fairly complex searches:
  - ("computer games" OR "video games" OR "serious games" OR "simulation games" OR "games–based learning" OR "MMOG" OR "MMORPG" OR "MUD" OR "online games") AND ("education" OR "learning") AND "evaluation

Finding your research papers

- So if you click on a particular link you will be asked to log in with your BannerID and Network password
- So we will select Science Direct as an example

Finding your research papers



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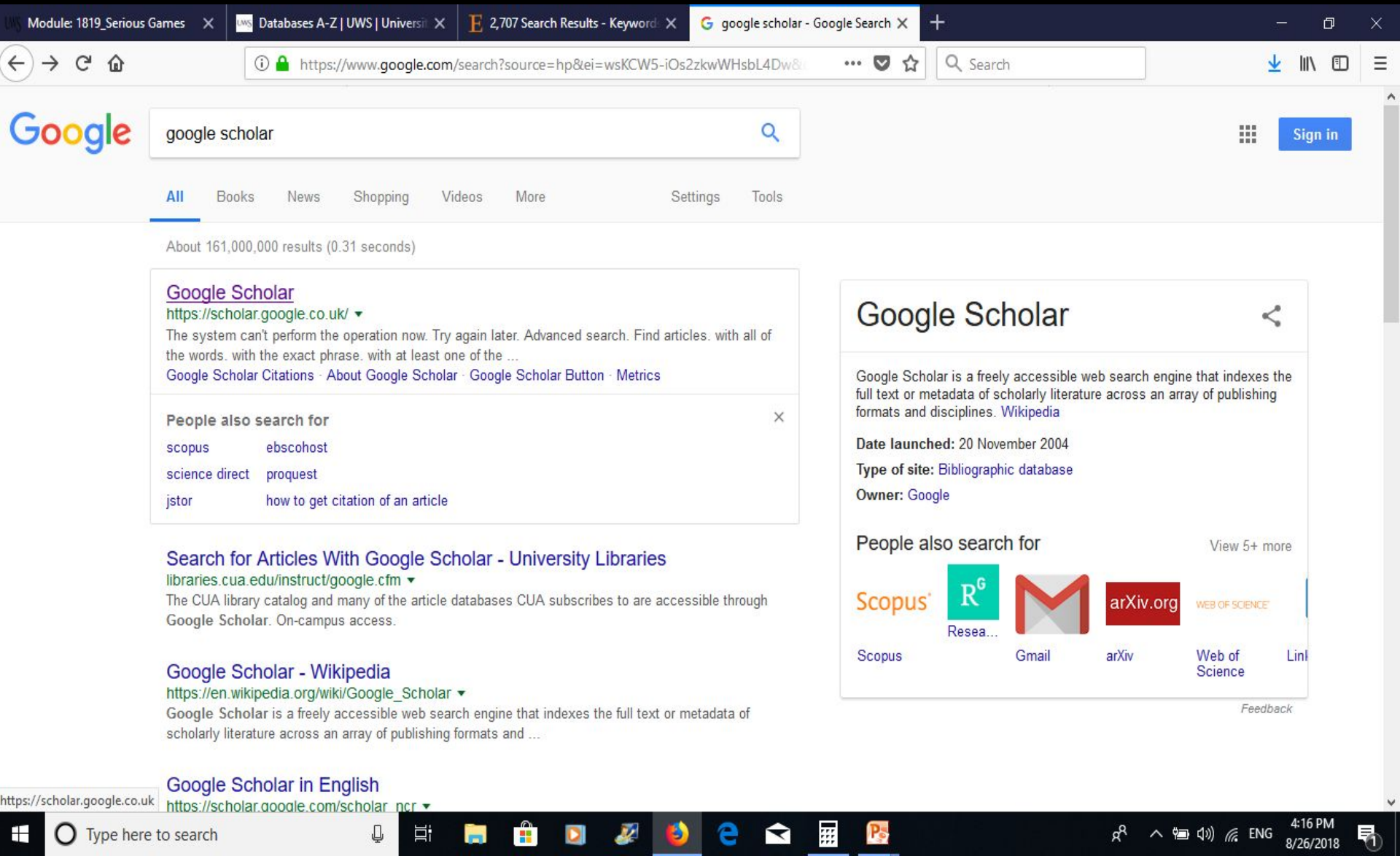

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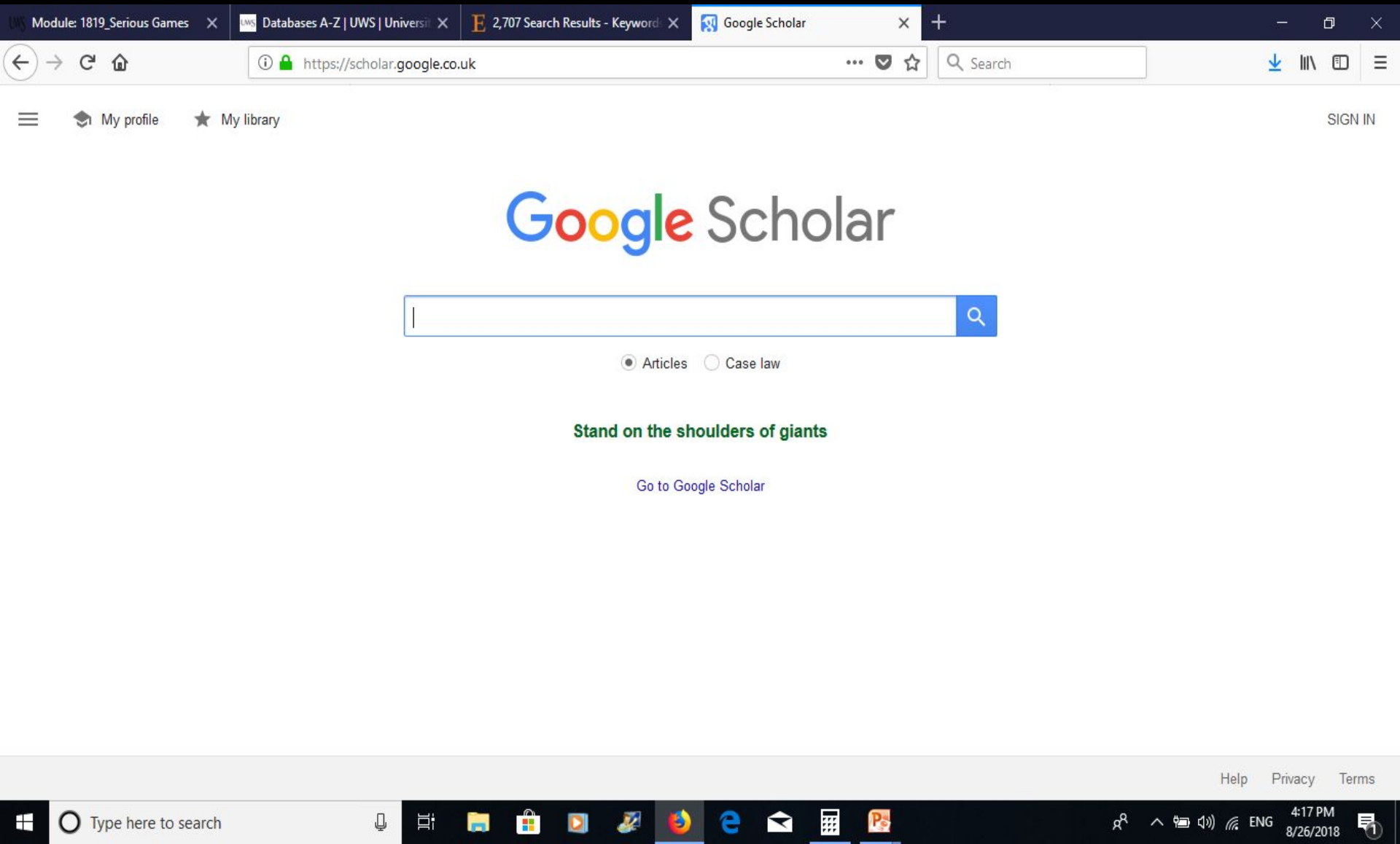

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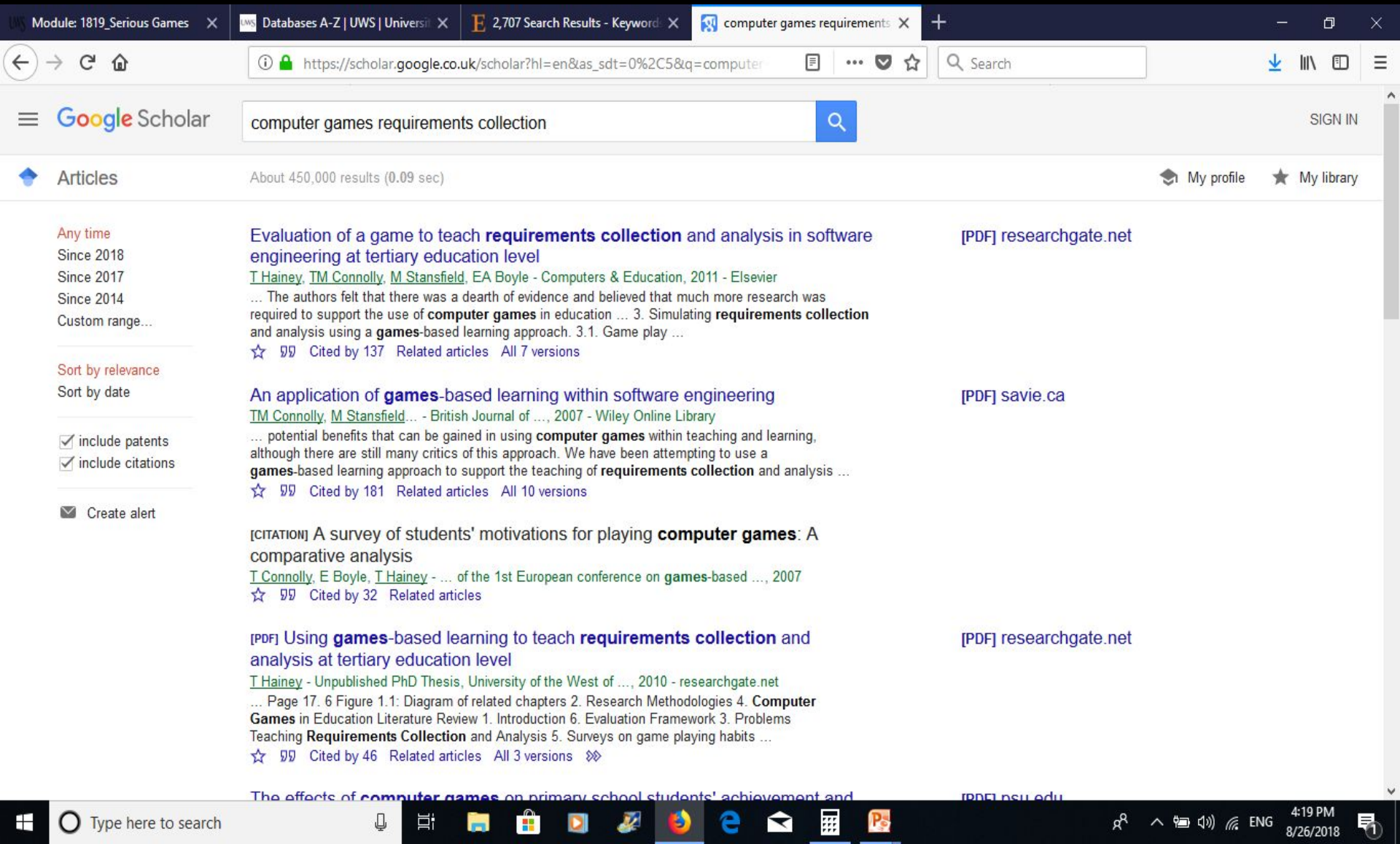

Finding your research papers

- If you type in your search terms to Google and put pdf after it then papers will also appear
- So there are thousands of papers on serious games, games–based learning, computer games for learning in hundreds of subjects
- This is also very useful for you honours dissertation and you should probably not need to use this phrase:
  - “I can’t find any papers”
  - Any academic that hears this automatically thinks…
  - I used this exact phrase in 2005

New problem

- Now you probably have too many
- How do you decide what papers are relevant and are the best to mention in your dissertation or small literature review?

Hierarchy of research papers

- In terms of academic credence and importance
  - Journal papers
    - Peer reviewed and in a well known journal with an impact factor
  - Conference papers
    - In conference proceedings and have been presented to the academic community
  - Edited Book Chapters
    - Some form of reviewing
  - Books
  - Grey literature
    - Games relevant sites
    - Gamasutra

Reading research papers

- This is an academic skill
- An experienced academic can look at a paper and objectively identify strengths and weaknesses
- You seek out the information that you want quickly and efficiently
- You don’t read a research paper in it’s entirety unless it is particularly interesting to you
- One of our literature reviews identified 7392 papers with 129 being relevant

Reading research papers

- Firstly establish a list of criteria
  - Use of serious games/games in education
  - Above the age of 14
  - Had some form of empirical evidence associated with the outcome
- Skim the abstract
- Skim the conclusions
- Be able to identify some of the following attributes about the paper

Qualitative and Quantitative

- Gay and Airasian (1996) state that the underlying belief of qualitative research is *"meaning is situated in a particular perspective or context, and, since different people and groups have different perspectives and contexts, there are many different meanings in the world, none of which is necessarily more valid or true than another."*

Qualitative and Quantitative

- Falconer and Mackay (1999) state, "*the assumption underlying the quantitative research approach is that research designs should be based on an objective view of the world and follow the positivist model of controlling variables and testing pre-specified hypotheses.*"

Qualitative and Quantitative

- Gay and Airasian (1996) relate quantitative research to what the researcher must do, namely:
- 1. State the hypothesis and the research procedures that will be employed to conduct the research, prior to the research being conducted.
- 2. Attempt to maintain control over factors that could possibly interfere with the data collected.
- 3. Use large enough samples to provide statistically meaningful data.
- 4. Apply data analysis techniques that rely on statistical procedures.

Qualitative and Quantitative

- Clark–Carter (2004) believes that *"the distinction between quantitative and qualitative methods can be a false one in that they may be two approaches to study the same phenomena. Or they may be two stages in the same piece of research with a qualitative approach yielding ideas which can then be investigated via a quantitative approach. The problem arises when they provide different answers."*

Hard and Soft Schools of IS

- The field of IS is split into two schools of thought being the hard and soft systems inquiry approaches. Hard is the more scientific approach that is based on facts and measurements and soft is a more subjective approach that is based on feelings, perceptions etc. The soft approach is generally seen to be the more human of the two.

Hard and Soft Schools of IS

- The hard approach to systems development *"assumes firstly that there is a problem to be solved that is logically based and that has a computer solution, and secondly, that the computer solution can integrate well into the organisation, without having taken account of wider social or psychological factors."*

Hard and Soft Schools of IS

- The soft approach to systems development *"regards the hard approach as being too narrow. It allows for problem situations that may be investigated using a variety of techniques, and it also takes into account the wider organisational context by focusing on social and psychological issues related to the development and impact of an information system in an organisation. "*

Qualitative and Quantitative

- In summary
- Quantitative – Positivist – Objectivist – Mathematical – Numerical – Statistical – NUMBERS!
- Qualitative – Interpretivist – Subjectivist – Dialogue – Thematic – Linguistic – FEELINGS!
- You have to decide which one you are:
  - Quantitative is considered stronger
  - Qualitative is not considered to be unimportant but is generally considered weaker in Computer Science research disciplines
  - Mixed
- You can basically decide this in a paper by the primary methodology

What Methodology is Utilised? Major Methodologies

- Experiments
- Quasi–experiments
- Correlational
- Surveys, tests and questionnaires
- Case studies
- Observational research
- Interviews
- Longitudinal
- Archival
- Ethnography
- Meta–analysis
- Content analysis

Major Methodologies

- Sometimes you can get a mixture of methodologies
  - Experiment
  - Follow up interviews
- Methodology is probably considered to be more important in research papers now and will sometimes be explicitly stated

Primary or Secondary?

- This is quite an easy one
- Are they undertaking some new research with some new results?
  - The paper should be covered in results
- Or are they simply presenting a synthesis of results from other people
  - Sometimes this is to bolster a research proposal so you may get some research proposal at the end

What is the Research Design?

- If there is some form of experiment is it:
  - Pre-test/post-test control group/experimental group
  - Is it randomised? RCT
  - Pre-test/post-test experimental
  - Is it just pre-test or just a post-test?
- You can see from those designs that quantitative and qualitative techniques can be used

Is the paper empirical or discussional?

- Empirical evidence is evidence obtained through scientific (numerical) or observational study
- If it is presenting some new evidence whether that is quantitative or qualitative then it is empirical
- Some poor conference papers will conduct a survey of the literature and try to bolster a new point
- Systematic literature reviews are a grey area
- A synthesis of the literature is great but still secondary

Are there participants?

- This should be pretty clear cut
  - Generally the number of participants is explicitly stated
- Sometimes papers are shady and don't give you all of the information
  - Lennon (2006)
- Are the numbers consistent?
  - Squire *et al.*, (2004)
- Does it make sense?

What are the research questions?

- Sometimes these are explicitly stated
- Sometimes they are a little more implicit and you have to dig a little deeper or try to draw it out of the paper
  - What is the main purpose of the study?

What are the results?

- This is something that in your literature reviews for your honours projects and for this modules that the academics want to know
- Sometimes there can in fact be multiple results
  - In the case of a survey – it may have been trying to find out a few things
- In the context of this module
  - Was the game better?
  - Was it the same?
  - Was it worse? Than the traditional teaching approach?

What are the limitations?

- Generally an objective paper will state what the limitations of the study are
- The primary limitation associated with games-based learning and serious games is generalisability
- You are allowed to highlight research limitations in terms of:
  - Research design
  - Methodology
  - Analysis techniques utilised

Inferential statistics

Selecting an appropriate statistical test

- Two major factors determine the correct test for any particular set of experimental results. 1) the research design and 2) the nature of the dependent variable, that is the actual data

1) Research Design – One–sample design, two–sample designs, k–sample designs, correlations

Inferential statistics

2) Parametric

- Normality of distribution – Shapio–Wilk's W test is a formal test for normality. Kilmorgorov–Smirnov (K–S) test or K–S Lillefors test, chi–square test
- Homogeneity of variances – Levene's test, Bartlett's test
- Interval level or ratio level data

Inferential statistics

http://changingminds.org/explanations/research/analysis/parametric_non-parametric.htm

	Parametric	Non-parametric
Assumed distribution	Normal	Any
Assumed variance	Homogeneous	Any
Typical data	Ratio or Interval	Ordinal or Nominal
Data set relationships	Independent	Any
Usual central measure	Mean	Median
Benefits	Can draw more conclusions	Simplicity; Less affected by outliers
Tests		
Choosing	Choosing parametric test	Choosing a non-parametric test
Correlation test	Pearson	Spearman
Independent measures, 2 groups	Independent-measures t-test	Mann-Whitney test
Independent measures, >2 groups	One-way, independent-measures ANOVA	Kruskal-Wallis test
Repeated measures, 2 conditions	Matched-pair t-test	Wilcoxon test
Repeated measures, >2 conditions	One-way, repeated measures ANOVA	Friedman's test

What analysis techniques are used?

- Can just be basic graphs
- Ask yourself if these are used sensibly
- Descriptions
- Thematic analysis

Checklist

Criteria	
Qualitative/Quantitative?	
Is it primary or secondary?	
What methodology is utilised?	
What is the research design?	
Empirical or discussion?	
Are there participants? How many?	
What are the research questions?	
What are the results?	
What are the limitations?	
What analysis techniques are used?	
Was a control group utilised?	
Reference	

Paper Categorisation Exercise

- Answer these questions for 6 papers that will be provided