UCD School of Information & Library Studies

IS10050: Digital Judgment

Truth, Lies and the Internet

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A digital resource guide to mechanical engineering

By Colin Browne, Sean Sheridan and Shaunagh Carew

Description

The purpose of this guide is to help mechanical engineering students become more familiarised with resources that we deem vital to the understanding, and gathering of information. It is designed to facilitate students, and help guide them to trustworthy and reliable sources to use to further their education. It is a guide intended to make life easier for any mechanical engineer.

The target audience for this guide is primarily students of mechanical engineering; it will also be of interest to prospective students of mechanical engineering as it will give a valuable insight into the subject. We would hope that the quality of the guide could interest lecturers to share it with their classes. We aim to make our guide easy to follow and approachable so it could be a resource used by a very wide audience.

This guide is based on the topic of mechanical engineering. It is considered one of the most wide-ranging forms of engineering. If something moves or changes temperature mechanical engineers are more than likely involved. Examples of items which involve mechanical engineering are engines, medical devices and radiators. Engineering and in particular mechanical engineering has a huge influence in our daily lives and will continue to influence our lives in the future.

This guide contains ten high quality resources suitable for mechanical engineers; it also contains a description which gives an overview of the guide. The primary part of this guide consists of the ten resources; these resources serve the needs of students, providing valuable pathways to further learning, increasing the effectiveness of self-education and making studying mechanical engineering a far more enjoyable experience.

This guide presumes that the reader has a very basic knowledge of some of the key concepts of engineering, mainly maths and physics. Even though the majority of the resources included start at the very basics of the subject and gradually increase in difficulty. The guide involves such high quality and recent resources that it is plausible that any level of a mechanical engineer would gain knowledge from using the guide.

The guide is instantly accessible to users, it is a free flowing easy to follow guide. It is very clearly organised, each resource is given its own section within the guide, the appropriate information about the resource is shown in a clear and

understandable manner. The resources are listed alphabetically, this allows users to quickly relocate a resource they have used and found useful in the past.

Resources

Source 1

Key details

Full title: http://www.khanacademy.org

Name of creator: Salman Khan

Date of creation: August 2004

Location: Boston, America

Abstract

The aim of this website is to provide the public with the means to learn almost anything for free. The site deals with varying subjects and explores a vast range of topics under each subject. Maths, Science, Computer Science, Finance & Economics, and Humanities, are the main subjects covered. Topics such calculus, cosmology, core finance, and American civics are dissected and broken up into small understandable chunks. It is a non-profit organisation which relies on donations to keep producing the online tutorials and lessons. The website provides questions and mini-tests designed to help test your progress. The solutions can be easily revealed if the user gets stuck on a

particular aspect of the problem. The user is rewarded with a series of badges for completing each test.

Pathway

This resource was found via the Google search engine, I had heard about this source from a close friend. He had been finding some of his maths lectures difficult to understand. He then said that after attending the maths support centre which is a free service provided by UCD. The maths assistant there pointed him towards the Khan Academy. Typing "khan academy" into Google led me straight to the correct page. Due to the fact that the website name was known I didn't think it was necessary to use advanced searches or directories to find the source. Thankfully this approach paid off.

Evaluation

I used the 21st century information fluency model to evaluate the resource. The first thing I decided to evaluate was the author of the piece, the author and his credentials have a huge bearing on the quality of the piece. On some brief investigation Salman Khan was found to be the author and CEO of the website. Salman Khan is a very well educated man; he holds four separate degrees, A BS in maths, A BS and MS in electrical engineering and computers. All of which he obtained from Massachusetts Institute of Technology one of the best colleges in the world. M.I.T frequently is at the top of the majority of surveys carried out on the quality of colleges, he also obtained an MBA from Harvard Business School which is also constantly rated as one of the best colleges in the world. The website is updated with new videos and tutorials so it is relevant, and current. The website doesn't seem to show any bias, it aims to educate people not provide them with opinions or points of view. Links to this website are all educationally based; there are some ".gov" websites that link to it. Most of the link to websites seemed to be very factual and of a high quality. Engineers could use this resource in conjunction with their own lecture notes to gain a greater insight into their chosen subject. Starting from the basics working their way up to a very advanced level.

Source 2

Key Details

Full Title: http://www.wolframalpha.com/

Name of Creator: Stephen Wolfram

Date of Creation: May 2009

Location: United Kingdom

Abstract

Wolframalpha is an answer engine, basically it takes input and instead of producing a list of resources or web documents like a search engine it produces numerical or factual answers. The answer engine is capable of translating everyday questions into data which can be easily processed by the software, much like the website “Ask.com”. The answer engine is capable of reading a question such as "How old was King Henry the 8th in a given year?" A question like this would yield an answer similar to "Age at start of given year: XX years old", and a biography link.) Wolframalpha uses very sophisticated mathematical codes to produce answers. The advantage of using this tool in mechanical engineering is that the equations for very complex questions are available, all that is required is the relevant variables and the answer engine produces an accurate answer, saving time and effort.

Pathway

This resource was found via the advanced Google search. By applying Boolean search logic, the results were narrowed down and made more specific. Using the advanced search was a great advantage and made finding relevant information far easier. Terms search as “answers, numerical, facts.” Were grouped together

using parentheses and the "OR" function. Terms such as "engine, compiler, and calculator" were grouped similarly; the two parentheses were then "ANDed" together. This search brought me to a website that eventually linked me to Wolframalpha. I did a quick Google search on wolframalpha and found page upon page expressing how good a resource it is, some even claiming it is far better than Google itself. This verified that I'd found a source worth investigating further.

Evaluation

Yet again the 21st century information fluency model was used to analyse the resource. The person accredited with making wolframalpha is Stephen Wolfram. Wolfram attended both Eton and Oxford but failed to complete a course in either as his main concentration was a love for mathematics. He had papers published and widely cited by the age of 18, also receiving a highly prestigious MacArthur award. He is considered an expert in physics, computers and mathematics. The accuracy of the answer engine is what the entire website is based on, by using algorithms and huge databases facts and figures are poured out. The level of detail is astonishing. For example typing in "UCD" gives the name in Irish, location, number of students, cost of attending, and various other information. It is displayed in a far more factual way than Google; it comes across more like a poster presentation rather than a page of facts. It is non-biased as it provides verified facts not opinions. Wolframalpha relies on formulae that don't change overtime, or else it takes figures from the most up to date sources. The local weather can even be found. So the dates involved really don't make much of a difference, the information displayed by the answer engine is usually correct at the time. The majority of links to this website were from online forums, from scanning through the first few pages it is clear than many people hold wolframalpha in very high regard and are willing to recommend it to others. Engineers could use this website to find answers and solutions rapidly, even answers for very complex mathematics and physics questions are all easily accessible.

Source 3

Key Details

Full title: http://video.mit.edu/

Creators: lecturers and PhD students studying at M.I.T

Date: Created on a continuous basis

Location: Massachusetts, America

Abstract

Massachusetts institute of technology (M.I.T) has created a series of educational videos on their ground breaking research. Since M.I.T is one of the leading universities in the world it receives both extremely capable students and also plentiful sponsorship programmes for further research. The videos vary in complexity; some videos will be alien to users as they are very complex and go into a huge amount of detail. This can be just as much as an advantage as a disadvantage; if you're interested in a certain topic and there is an M.I.T educational video available on it you are accessing a very thorough and scholarly source.

Pathway

This research was found by what started off as some web browsing. I was looking at the top universities in the world, and wanted to see if there were any videos on them. Much like the videos UCD have produced for prospective students. Generic Google searching returned few results of interest so I decided to do an advanced search. I put the top colleges in parentheses and then put terms such as videos, and tutorials into another set of parenthesis. I then told the search engine to show only video results, first there were boat races between

each college but then I saw a list of educational videos from M.I.T. It was easy to find the homepage from there.

Evaluation

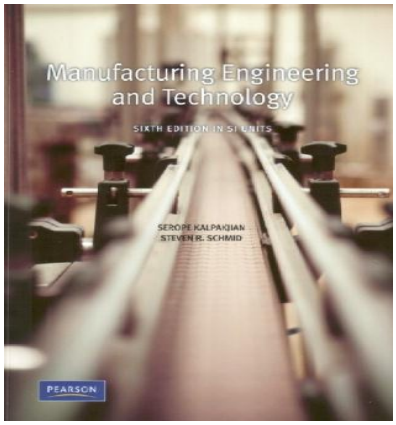
The 21st century information fluency model was relied on to judge the quality of the resource. One of the most telling parts of the M.I.T videos are the lecturers who are given the tutorials, once the name of the lecturer is found, he or she is inevitable an expert in their field. Many of the lecturers featured are award winning, and are highly respected in their given fields of work. The research teams are sponsored by multinational companies which could lead to a question of the research being biased. It would be very rare for an experimental team to be biased in their results as it would very quickly be spotted by their peers. Links from this webpage lead to more M.I.T pages, which seem to be of equal quality. The accuracy of the information is hard to disrepute since the research being undertaken is at the forefront of each field. Engineers would get great use out of this resource, different view points and examples are used. Topics are in general very thoroughly discussed. Many of the research done is for Masters Students, the research shown in M.I.T could inspire others with ideas for their thesis.

Source 4

Key Details

Book Name: Manufacturing Engineering and Technology

Authors: Serope Kalpakjian and Steven R. Schmid.



Abstract:

This is an extremely helpful resource available to anyone undertaking studying for, or undertaking a career in mechanical engineering with manufacturing being of utmost importance in the world of mechanical engineering. It includes various explanations and descriptions of most manufacturing processes and methods in industry, going back through the history of these processes and the improvements made to them. It is a useful guide for any mechanical engineer because of the pivotal role that mechanical engineering plays in the manufacturing world. This e-book also contains detailed information and full chapters about the structure of metals, mechanical behaviour of metals and, the production of alloys, metal casting methods, as well as forging and joining techniques such as welding are explained in great detail. This information is not only important to engineers it is essential. While metals are mainly discussed, ceramics and polymers are also explained.

Pathway:

It can be found by searching Google scholar for the title in a broad search or by searching in an advanced way, using terms included within the book or by knowing one of the author's names. Boolean logic plays a crucial role in searching for resources, such as this one on search engines such as Google or more importantly Google Scholar, in search of information from a more academic source. The method of searching called Boolean logic can be used on Google's general search engine using symbols and keywords but it has a more user friendly application on Google Scholar in the advanced search window. For the purposes of this project it is available online as an e-book, but also as a textbook. It can be bought on amazon in the form of a hard copy or an e-book, at the following address: http://www.amazon.com/Manufacturing-Engineering-Technology-Serope-Kalpakjian/dp/0136081681/ref=sr_1_1?s=books&ie=UTF8&qid=1354121052&sr=1-1&keywords=Manufacturing-Engineering-Technology-Serope-Kalpakjian+e+book . However for many students this is more popular stored as a PDF on a digital device.

Evaluation:

Without looking into the popularity of this as a text, but rather in looking at authenticity, we can clearly see that the authors are outlined in the first couple of pages clearly: Serope Kalpakjian and Steven R. Schmid. This leaves us in no

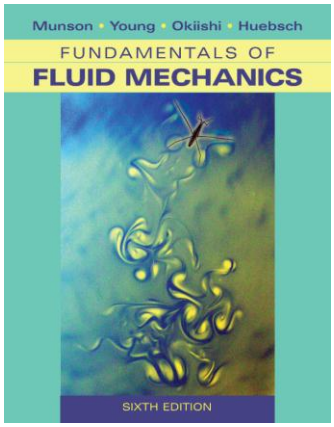
doubt that this source is genuine, as well as this the same book in the form of a hard copy has a legitimate ISBN number. Professor Serope Kalpakjian has been working in the Illinois Institute of *Technology* since 1963, as well as that Professor Steven R. Schmid is a Professor in the University of Notre Dame, Department of Aerospace and Mechanical Engineering**.** It can also be seen that this book was made available as an e-book in 2008 having been revised so this would indicate that the information inside is very relevant to modern day engineering. This source comes with strong recommendations from academics within the world of engineering for use with various modules in an engineer's education for this reason it is a must read for engineering students and a great reference for those already working in the industry.

Source 5

Key Details

Book name: Fundamentals of Fluid Mechanics

Authors: Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, Wade W. Huebsch.



Abstract:

This is a lot like manufacturing engineering in that it can also be found through searching Google Scholar. This book is mostly applicable to the field of mechanical engineering in that mechanics of fluids plays a big role in this area. Problems to do with fluids are both central to the engineers training and development, as well as in the workplace. It covers all aspects of mechanics of fluids including fluid statics, dynamics, kinematics, flow and dimensional

analysis, as well as this it also includes a chapter on turbo-machines pipe flow and flow over immersed bodies giving a fantastic and thorough explanation of various areas of fluid mechanics.

Pathway:

Fundamentals of fluid mechanics is another resource available online again in the form of an e-book or a PDF. It can be bought on amazon in the form of an e-book at: http://www.amazon.com/Fundamentals-of-Fluid-Mechanics-ebook/dp/B0034L3KH2 . This is a lot like manufacturing engineering in that it can also be found through searching Google Scholar, again either using the advanced search and Boolean logic or using the broad search because of the popularity of this source it will still feature. This book is mostly applicable to the field of mechanical engineering in that mechanics of fluids plays a big role in this area. Problems to do with fluids are both central to the engineers training and development as well as in the workplace.

Evaluation:

It can also be seen that this book is a reliable source, in the preface all of the authors are listed as well as their respective places of education/study and their respective departments are shown clearly. Bruce R. Munson (Professor at the IOWA State University) , Donald F. Young(Department of Aerospace Engineering and Engineering Mechanics), Theodore H. Okiishi (Department of mechanical engineering Iowa State University), Wade W. Huebsch (Department of mechanical and Aerospace Engineering, West Virginia University). There is also a section about the authors and their respective areas of study. In the text book version there is an ISBN indicating publishing regulations. It cannot be overlooked that this source of information is very popular within the mechanical engineering world. For a lot of mechanical engineering students the use of this book will be compulsory however for those who it is not compulsory it is a fantastic source of information through a proven track record with both engineering students and academics alike, the use of which is well worth some consideration.

Source 6

Key Details

Full title: https://www.wileyplus.com/WileyCDA/

Author: John Wiley & Sons

Abstract:

Wiley plus is a website used for online teaching and learning. This is widely used by engineering students because it is an interactive teaching and learning resource with many advantages. Namely, it is used for modules in fluid mechanics (fundamentals of fluid mechanics) and physics (Halliday Fundamentals of Physics ninth edition) as well as many more. This is most likely contributing more effectively to the areas of engineering and science because of the sheer nature of the subject matter of problem solving.

Pathway:

This website can be found at the URL: https://www.wileyplus.com/WileyCDA/ .I was first informed of this resource through a module co-ordinator conducting a fraction of his course through this website as this can be used in conjunction with various different textbooks using an online version of the book and various different exercises both for examination and practice alike, depending on the course coordinators preferences. However this may also be found by searching Google in a broad search or a specific search because of the popularity of this website, it will rank in the top results.

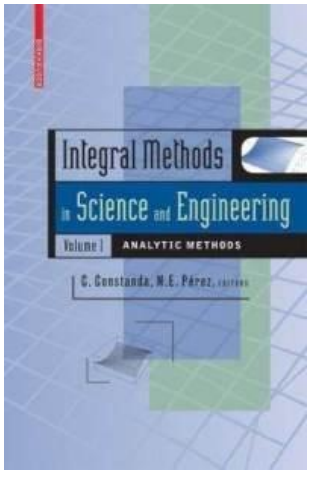
Evaluation:

There are various advantages to this resource in that it provides a great deal of easily understood schematics and videos to aid the students understanding of the subject matter. From a financial point of view this website is a revelation because of the price of the textbooks. It can be seen that in many cases for less than half of the price of many expensive textbooks an e-book can be made available to the student, through his/her password accessed account on the Wiley Plus website. Instant feedback can also be given to the student in response to tutorial and practice questions and grades on continuous assessment may also be obtained instantly. Wiley Plus has been set up in collaboration with the publisher John Wiley & Sons Inc. So giving that this is such a well-known publisher there is no doubting the authenticity of what is displayed and transmitted with this site being used in collaboration with a given book. A resource such as this can be of great use to a mechanical engineering student because it allows a more independent learning experience and it also allows the tutor to monitor the progress of all of the students with user accounts in an effective and private way.

Source 7

Key Details:

Integral Methods in Science and Engineering: e-book, C. Constanda and N.E Perez.



Abstract:

Central to the study of mechanical engineering is the subject of mathematics. So gaining a decent knowledge in the subject is of great benefit to any engineer.

This book is based around the concepts of ordinary differentiation, Integration, partial differentiation and can be used in acquiring a greater understanding of various calculus modules taken in the study of mechanical engineering at college.

Pathway:

In searching for a book on the topic of integral calculus, in the UCD library catalogue this source was found at: https://library.ucd.ie/iii/encore/search/C__S%28mechanical%20engineering%29%20%28Integral%20%29%20f%3Az__Orightresult__U1?lang=eng&suite=cobalt . It is freely available online in the form of an e-book through links from the UCD database and can also be found by searching Google Scholar. In searching, Boolean logic was used through the advanced search system in the UCD library catalogue. 'Integral' and 'mechanical engineering' were both searched for as keywords and this was the top result.

Evaluation:

The validity of the source can be proven in that it has an ISBN (International Standards Book Number) which specifies strict publishing laws and standards. What is even more important again is that the authors are very well known within the mathematical world and their work has been made famous the world over. Having looked at this book in detail to prepare feedback it can be found that this is an extremely helpful resource for any student of Science or engineering attempting to study this kind of calculus at a high level. The real beauty of this source is that not only does it apply to Students of the given subject it may also be used by practising mathematicians, Engineers and scientists worldwide. It cannot be overlooked that in searching a library database such as UCD there is no doubt about the legitimacy of the search results and credibility of the authors is without any uncertainty and with a publication date of 2008 there is no doubt about the recent status of the findings outlined.

Resource 8

Key Details:

Engineers Ireland: (This Website was the natural evolution of a historical organisation set up originally in 1835 and legally being recognised in 1969 by the Irish government).

Abstract:

One cannot look at sources of information for mechanical engineers and overlook Engineers Ireland. Engineers Ireland is the professional association for engineers currently studying and practicing in Ireland. It gives further qualifications to graduates in the workplace and a student membership can also be extremely beneficial. This is an association set up to aid engineers in Ireland to collaborate with others in this profession.

Pathway:

The homepage can be found at the following address: http://www.engineersireland.ie/home.aspx and this can be searched for using Google and also researching the many terms to do with engineering in Ireland, more specifically here it was found using 'Mechanical Engineering In Ireland' and it came up as one of the top results obviously including all of the terms (In accordance with Boolean algebra), and having validated the top six results using all of the methods outlined in lectures this was found to be the most suitable source.

Evaluation:

This website is updated every day and is also associated with some of the most famous employers, multi-national companies and organisations in Ireland associated with the subject, namely the ESB, Boston Scientific and Hewlett

Packard. It is also associated with the Irish government in that it is the association which holds the rights to presenting professionals with the professional title of Chartered Engineer or other depending on his/her career development. These are very important titles in the workplace and for seeking employment in which they are both recognised nationally and internationally. This leaves no qualms about this being a trusted source. As well as offering membership to professionals, Engineers Ireland also offers membership to students who are studying accredited engineering programmes. This offers students the opportunity to communicate with other engineers to discuss and to develop concepts and get advice on what skills are required in a given workplace as well as offering free online maths grind for undergraduates. To the newly graduated, it compromises of various ways to support career development through a 'graduate transition programme' and help with 'job seeking support'.

Resource 9

Key Details:

Book name: Basic Engineering Circuit Analysis

Authors: J. David Irwin & R. Mark Nelms,

Date: October 26, 2010

Location: Hoboken NJ United States of America.

Abstract:

The concepts covered in Basic Engineering Circuit Analysis consist of basic electrical circuits. A broad range of topics are covered in this text starting from basic concepts in electrical engineering and circuit analysis to more specialized topics. The chapters begin with specific learning objectives, around which all chapter content is structured. Key concepts are described in the text and illustrated with example problems which are solved. Similar problems with no solutions are provided at the end of each chapter for the student to complete. This text is suitable for students in many engineering disciplines including electrical and computer engineering.

Pathway:

This resource was found via the UCD library. First, we typed in the words circuit analysis into the main search bar. Then using the advanced search options offered we were able to include the author, keywords, which library collection, language and year of publication. From the results page, the exact name of the book could be seen, Basic Engineering Circuit Analysis, J. David Irwin & R. Mark Nelms, which was what we were looking for.

Evaluation:

We used the 21st century guide to critically evaluate this resource. *Author:* When J. David Irwin was researched, it was found that this author had a vast amount of experience in the electrical engineering area. Currently he is the Earle C. Williams Eminent Scholar and Electrical and Computer Engineering Department Head at Auburn University. As for his educational background, Irwin received a B.E.E. degree from Auburn University (1961), and also earned M.S. and Ph.D. degrees from the University of Tennessee, Knoxville, in 1962 and 1967, respectively. It is evident that this author has a renowned reputation, as he was won various awards for his work. Among his notable awards is the IEEE's Richard M. Emberson Award (2000) for a long and distinguished record of service to the IEEE in the educational, technical and publication areas.

Publisher: John Wiley and Sons is a global publishing company that specialises in academic publishing. Using the website wiley.com, a mission statement of the company could be found. John Wiley and Son's mission statement is as follows: John Wiley & Sons, Inc., aspires to be a valued and respected provider of products and services that make important contributions to advances in

knowledge and understanding, a role that is essential to progress in a healthy and prosperous society.

Resource 10

Key Details:

Website name: Examville

Author: Nilanjan Sen (Founder and CEO),

Date:2007

Location: New York City.

Abstract:

Examville is an online education resource which allows users to connect and interact with each other. For students, examville offers live online classes, homework help, exam preparation, eBooks, study guides, video tutorials and much more. Not just for students, examville allows teachers to share their knowledge and also generate an income by hosting their own online classes and selling study documents. This website brings learning tools and technologies to new, dynamic and interactive levels. By signing up to this premier digital education marketplace and becoming part of this global learning environment, users are able to connect, learn, teach, sell and earn.

Pathway:

This resource was found via the google search engine using the advanced search option. I had heard about this source from a close friend. I simply typed in the word “examville” and the exact result was found. Due to the fact that the

website name was known I didn't think it was necessary to use advanced searches or directories to find the source.

Evaluation:

I used the 21st century information fluency model to evaluate this resource. Firstly, I'd like to discuss the founder and CEO of this website, Nilanjan Sen. I used the search engine www.google.com to investigate Nilanjan Sen. The information I obtained about Nilanjan Sen was that he worked in the education industry as a course developer and test preparation instructor for companies such as Kaplan and The Princeton review. It is evident that the creator of this website has had relevant experience in this particular area. Also, I found out that this website was a finalist in the IBM Global Entrepreneur SmartCamp competition in New York. This information proves that the website is successful and globally recognised. Examville is regularly updated with new videos, tutorials and downloads therefore it is current. I can also see that the website doesn't seem to show any bias, its aim is to provide an interactive educational platform. At the bottom of the webpage, there is a legal section which includes terms of use, privacy policy, copyrights and trademarks. This tells us that this website is legit and there are no hidden agendas.

Reflection:

Overall, we worked well in our group throughout this project. By collaborating we were able to use the combined talents of our group members, with everyone contributing knowledge and ideas. Our group was decided upon almost straight away as we all knew each other. We are in the same course here in UCD – mechanical engineering. This helped greatly because we were able to update each other regularly and discuss our project throughout the semester. Firstly we needed to come to an agreement on what our digital resource guide will be and who will it be aimed at. We also needed to establish a common goal within the group. Having contacted each other via Facebook, we arranged to meet up after lectures one day, discussed what should be our chosen topic and set out a clearly defined objective. Group work is all about team effort, so in our next arranged meeting we broke down the project and allocated jobs to each individual. We also thought it would be a good idea to lay out a timeline including who will do what, in what format and by when. So from our second meeting, we divided out the work equally and agreed we will have completed one resource each in time for the next meeting. The workload was divided up

was as follows – *Shaunagh:* Two digital resources and the reflection, *Colin:* Three resources and the description, *Sean:* Five resources. We met up regularly throughout the duration of this project. Each week, we went to the library after lectures had finished and booked a study room for the following day. These study rooms proved to be productive environments for us to work in. At these meetings, each member presented their work and we all discussed how we were getting on. Before going our separate ways after the meetings, we made sure to maintain clarity and reflected on what work needed to be completed by the following session. The only challenge that we encountered during this group project was the occurrence of mid-semester exams. We all had four mid-semester exams, so this put stress on each to study for these and therefore the work for our group project was dismissed for a few days. We addressed this problem as a group and to overcome this challenge, we arranged an extra two meetings to make sure we were still on track to achieve our objective. In these extra meetings we re-evaluated and each individual in the group put in the extra effort needed to complete our work. Even though our plans changed a little, we stayed positive and completed the work. At the start of week 12, the final week of lectures, our digital resource guide was finished. Overall, we were happy with how our digital resource guide looked and we were confident that the purpose of the guide had been achieved. In conclusion, we worked effectively in our group to achieve our objective and we each obtained a great learning experience as we were able to share research and gain appreciation of other peoples perspectives.