

2016-2018
Assessment for Learning (Book Chapter Jigsaw)
1st, 3rd, 4th 5th Year Students

Rationale

This coursework and classroom reading activity is an “Assessment for Learning” (Afl) exercise (Sambell et-al 2012. p.51) that seeks to encourage students to take ownership and make sense of their learning through ‘organizing it into meaningful concepts, exploring ideas, reflecting, making connections by trying to link new content and associating it with what they already know’. This Afl “exercise” (students are active learners!) employs a “flipped learning” (HEA 2015) approach that requires each student to read a book chapter (and to make appropriate notes) before attending a peer learning tutorial session. During the tutorial students participated in a modification of a learning technique known as “the jigsaw classroom” (Voyles 2015). The jigsaw classroom required students to work collaboratively (mutual dependence) in small groups so as to share the learning activity (reading of four book chapters) making them responsible for their peers learning (as a teacher) as well as their own. The output is intended to produce evidence of synergy whereby the combined new knowledge is greater that it would be had the students undertaken the reading as individuals. Fairbairn and Fairbairn (2001, p.162) offer sensible advice to students in regards to how they should approach such a reading exercise:

‘Each member of your group should view himself as an explorer visiting an unfamiliar place- making detailed notes of the intellectual landscape, which he then shares with his co-explorers. It is as if each person draws a sketch map and offers a verbal guide to the main landmarks and significant features of the landscape of the text they have explored, thus facilitating the others in carrying out their own, more detailed exploration’.

References

- Fairbairn G J and Fairbairn S A (2001) *Reading at University: A Guide for Students*, Maidenhead: Open University Press.
- Higher Education Academy (2015) Flipped Learning, <https://www.heacademy.ac.uk/enhancement/starter-tools/flipped-learning-0>.
- Sambell, K., McDowell, L. and Montgomery, C (2012) *Assessment for Learning in Higher Education*. Abingdon: Routledge.
- Voyles, E.C, Bailey, S.F and Durik, A.M (2015) New Pieces of the Jigsaw Classroom: Increasing Accountability to Reduce Social Loafing in Student Group Projects, *The New School Psychology Bulletin*, 13(1):11-20.

Aims

-To focus the learning and assessment process on students being active in constructing their (own and group) knowledge (explicit and tacit) and to promote a 'reflective practitioner' behaviour akin to that of professional engineers.

-To introduce students to the role of civil engineering knowledge and practice and to establish a foundation on which students will be self-motivated to 'read' widely as a commitment to becoming a professional engineer.

- To introduce students to a collaborative learning space where peer knowledge is considered to be contributory (as opposed to 'in competition') to a holistic understanding of new knowledge whereby cooperation can be seen to lead to synergistic outcomes.

Task

Flipped Learning

Stage 1: Students (in groups of 4, the **jigsaw group**) negotiate who will read which book chapter from the four allocated chapters. Each student is required to read (question the text and graphics) their selected chapter and to make notes (key themes /new knowledge/ questions) for use during the jigsaw classroom event.





Access a pdf of your selected book chapter through the university library (**electronic resource**).

Flipped Learning & Jigsaw Classroom

Stage 2. Students assemble into temporary **expert groups (1-2 weeks later)** and each student uses their notes (key themes /new knowledge/ questions) as an aid to support a discussion where peer learning can flourish and where collaborative efforts can produce intellectual synergy. Each student should update their own notes to demonstrate the combined knowledge gained from the process. You will use these notes as a teaching aid when you reassemble in your **jigsaw groups**.

Stage 3. Students reassemble into their **jigsaw groups (directly after expert group)** and each student is required to assume the role of a teacher and to use their notes from the **expert group** process as an aid to conveying new knowledge to their peers. All students should make their own notes during the presentations so as to ensure that they have recorded the new knowledge that has been distilled from expert group process.

Table 1: Books for Jigsaw Exercise (all available through UOS library electronic books)

<p>1st year (n=165)</p>	<p>Ferguson, H and Chrimes, M (2011) <i>The Civil Engineers: The Story of the Institution of Civil Engineers and the People Who Made It</i>. London: ICE Publishing.</p>	
<p>3rd year (n=149)</p>	<p>Sherratt, F (2015) <i>Introduction to Construction Management</i>. Oxford: Routledge.</p>	
<p>4th year (n=120) Elective</p>	<p>Hughes, W, Champion, R and Murdoch, J (2015) <i>Construction Contracts Paperback</i>, 5th edition. Oxford: Routledge.</p>	
<p>5th year (n=16) Elective (20116-17)</p> <p>5th year (n=24) Elective (2017-18)</p>	<p>Gardner, I (2015) <i>Achieving Successful Construction Projects: A Guide for Industry Leaders and Programme Managers</i>. Oxford: Routledge.</p> <p>Doherty, S (2008) <i>Heathrow's Terminal 5: History in the Making</i>, Chichester, John Wiley & Son.</p>	

Assessment for Learning

All students who participated in the jigsaw exercise and who submitted a short reflective report were awarded a 100% grade (15 % weighting for a 10 credit module for 3rd, 4th and 5th year and 15% of a 20 credit module for 1st year students). The overarching aim was NOT to assess the explicit knowledge gained by each student but to encourage the students to explore the potential benefits from sharing knowledge with their peers. To be collaborative and collegiate rather than competitive.

The reflective report included a Likert scale questionnaire (see Table 2) in addition to a one-page (maximum) reflective account of their experience. The students were encouraged to write in first person and to be honest with their views and were reminded that they would receive a 100% grade whatever their view about the jigsaw exercise, positive, negative, indifferent. The students uploaded their reports to My Place and were reminded not to add their name on the report as these were to be anonymous submissions. A department secretary who had access to My Place assisted by chasing up students who did not submit their reports on time. The late submissions were accepted without penalty as a mean to ensure that students who were absent on the day that the jigsaw exercise took place were given an opportunity to meet with their **jigsaw group**.

I was cognisant of Norton's (2009. p.181) guidance that 'if we carry out research on [our] own students' learning, you have to be careful of undue influence or coercion'. I reiterated to the students on several occasions that I had no immediate access to determining who had submitted a particular report and that I was sincere in expecting them to be honest with their anonymous evaluation of the jigsaw experience. That the marks were in the process of participation, was made clear although it was evident that some students did not agree with this, particularly where their peers arrived at the jigsaw event without sufficient prior reading having taken place.

Norton, L.S (2009) *Action Research in Teaching and learning: A practical guide to conducting pedagogical research in universities*. Oxford: Routledge

Results

Quantitative Data

The quantitative results from the exercise are shown in Table 2. From a total of 497 students, 474 submitted a fully completed Likert questionnaire. Twenty-three students returned a reflective report without the questionnaire. As with the qualitative data (see below) the students' were informed to answer the questionnaire honestly and given that the reports were

to be submitted anonymously, to not think about how their answers should please me (acquiescence bias).

An initial assessment of the results suggests that the majority of student found their book chapter to be of interest, 355 students (75%) agreed strongly-agreed, and informative in regards to new knowledge about civil engineering practice. Whilst the qualitative results suggest that a sizeable number of students did not find the **expert group** activity of great use, the quantitative results show that 294 students (62%) agreed / strongly-agreed that they gained new learning from their peers.

In regards to teaching their peers, 392 students (83%) agreed / strongly-agreed that this activity had increased their self-confidence communicating ideas to others. In assessing their peers self-confidence, 355 students (75%) agreed strongly-agreed that their peers demonstrated confidence in communicating new knowledge to the group.

Given the importance of communication to the successful functioning of group tasks the ability to be a proficient listener is highly important, particularly given that during the jigsaw exercise new knowledge was conveyed verbally to peers. Whilst the qualitative data suggests that students found these exchanges to be informal, sometimes fun, they also spoke of excessive background noise due to the proximity of other groups, and peers who were inaudible. Only 244 students (51%) agreed / strongly-agreed that the exercise had helped improved their listening skills. However, 293 students (62%) agreed / strongly-agreed that listening to their peers talk had been an effective way to learn.

In seeking to encourage collaborative learning, 391 students (82%) agreed / strongly-agreed that the jigsaw exercise had promoted this approach. However 94 students (20%) agreed strongly-agreed that they would have preferred to have read all the book chapter themselves and not participated in the jigsaw exercise. The qualitative data reveals that some of these students were unhappy about relying on their peers to determine what is relevant for their personal learning. Aspects of distrust are mentioned. Moreover, 232 students (49%) agreed /strongly-agreed that they had read more book chapters above the one selected and the qualitative data reveals that this was either due to a genuine curiosity or to reassure themselves that their peers had not missed important knowledge. The qualitative data reveals that prior learning, particularly exposure to industry practice during summer placement also influenced responses to this statement.

Encouraging students in higher education to engage in reflective practice is typically achieved through Personal Development Planning (PDP). Whilst it is essential for our students to develop meta-cognitive skills over the piece, and to appreciate the importance of 'learning to learn', reflective practice appears to be a troublesome issue in undergraduate education. It

cannot be assumed that students will find it comfortable or enjoyable but perhaps this is inevitable and indeed part of the university transition to professional practice. 264 students (56%) agreed/ strongly-agreed that writing a reflective account of what new knowledge & skills they had taken from the jigsaw exercise had helped reinforce and consolidate their learning.

In recommending the jigsaw exercise for the following session cohort of students 343 students (72%) agreed / strongly-agreed that the exercise should be used again. The qualitative feedback has provided a number of valuable suggestions to improve the exercise. In relation to wider use of the jigsaw approach within the curriculum 231 students (49%) agreed / strongly –agreed that this technique should be recommended to other tutors within their course of study. In the qualitative feedback, some students were able to identify their preferred approach to learning a small number of students have developed an epistemic currency that aided their reflections.

Qualitative Data

The qualitative data totals 169,043 words of reflective text and is made up of:

- 1st year- 49,852 words
- 3rd year- 54,231 words
- 4th year- 47,370 words
- 5th year- 17590 words

The individual student reports for each year were compiled as separate documents with the fifth-year text being read first, followed by the first-year, fourth-year and then third-year documents. This reflected the scheduling of the jigsaw events over both academic 2016-17; 20017-18 sessions.

Whilst the volume of textual data would suggest that a software package such as NVivo would be appropriate for undertaking a thematic analysis of the text, I have a personal preference for using a manual approach. I enjoy immersing myself within the student responses and feel closer to understanding their emotions and perspectives by reading and re-reading text until saturation occurs. I acknowledge that my own epistemological beliefs that face towards a constructivist approach to learning may introduce an unintentional bias in how I undertake the coding of the text. However, I do seek to remain objective and true to understanding and representing the student voice in the coding and analysis of the data. I undertake coding using an inductive approach that involves an iterative process that results in the codes and subsequent themes being grounded in the data. This approach is aligned to grounded theory as proposed by Strauss and Corbin (1990) in that the purpose of evaluating the jigsaw exercise is to generate theory that emerges from the data.



Strauss, A and Corbin, J (1990) *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. Sage Publications.

Table 2: Likert Questionnaire Results

1 st (n= 165 from 179); 3 rd (n=149 from 154); 4 th (n=120 from 124); 5 th (n=40 from 40) Total (n=474 from 497)		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I found the book chapter that I read to be interesting.	1st	3	17	32	83	30
	3rd	0	8	16	100	25
	4th	3	11	17	73	16
	5th	2	3	7	24	4
	TOTALS	8	39	72	280	75
2. Reading my book chapter and listening to my peers talk about their learning has helped me to understand the practice of civil engineering work.	1st	2	6	35	81	41
	3rd	2	10	31	80	26
	4th	1	8	15	79	17
	5th	1	3	4	25	7
	TOTALS	6	27	85	265	91
3. When I participated in the expert group (i.e. all chapter 2 readers etc.) activity I was able to learn more than I had through just my own reading of the chapter.	1st	8	18	37	72	30
	3rd	11	25	32	52	29
	4th	4	16	19	42	39
	5th	1	3	6	22	8
	TOTALS	24	62	94	188	106
		0	6	30	75	54



4. Explaining what I learned to my peers in both the expert and jigsaw groups has increased my confidence in communicating my ideas to others.	1st					
	3rd	0	4	20	82	43
	4th	0	1	8	67	44
	5th	2	2	9	18	9
	TOTALS	2	13	67	242	150
5. Overall, I felt that my peers in the jigsaw group were confident in teaching the key knowledge from their chapters.	1st	4	16	51	66	28
	3rd	0	3	26	88	32
	4th	0	3	12	72	33
	5th	0	1	3	24	12
	TOTALS	4	23	92	250	105
6. Participating in the expert and jigsaw groups has improved my listening skills.	1st	6	25	43	67	24
	3rd	4	28	54	42	21
	4th	1	19	38	51	11
	5th	5	1	6	17	11
	TOTALS	16	73	141	177	67
7. Listening to my peers talk about their book chapter reading was an effective way to learn.	1st	1	16	53	60	35
	3rd	3	10	49	64	23
	4th	0	6	27	67	20
	5th	2	6	8	15	9
	TOTALS	6	38	137	206	87
8. The book jigsaw coursework group activities encouraged collaborative (shared) learning.	1st	1	8	31	66	59



	3rd	3	3	22	78	43
	4th	0	2	8	63	47
	5th	1	1	3	17	18
	TOTALS	5	14	64	224	167
9. I would have preferred to have read the four book chapters myself and not participated in a jigsaw exercise.	1st	51	53	24	17	20
	3rd	39	47	25	26	12
	4th	48	45	13	7	7
	5th	14	12	9	3	2
	TOTALS	152	157	71	53	41
10. I have read more chapters in the book than just my allocated chapter.	1st	29	27	18	39	52
	3rd	29	38	21	47	14
	4th	22	29	14	33	22
	5th	5	5	5	15	10
	TOTALS	85	99	58	134	98
11. Writing a reflective account of what new knowledge & skills I have taken from the jigsaw exercise has helped reinforce and consolidate my learning.	1st	10	17	46	59	33
	3rd	4	15	53	59	18
	4th	4	7	48	49	12
	5th	1	2	3	17	17
	TOTALS	19	41	150	184	80
12. I would recommend the book jigsaw exercise with 1 st , 3 rd , 4 th 5 th year students next year.	1st	9	16	36	62	42
	3rd	2	8	39	77	23
	4th	1	1	9	61	48

	5th	3	3	4	16	14
	TOTALS	15	28	88	216	127
13. I would recommend that other tutors use the jigsaw approach (other books / hand-outs / worked solutions etc.) to learning in other 1 st , 3 rd , 4 th 5 th year classes.	1st	14	20	53	52	26
	3rd	5	20	35	54	35
	4th	2	7	16	58	37
	5th	2	3	6	13	16
	TOTALS	23	50	110	177	114

Thematic Analysis of Reflective Reports

Themes

- Jigsaw (Alternative Pedagogy)
- Reading
- Enjoyable / Interesting
- Fun
- New Knowledge
- Self-confidence
- Communication Skills
- Reliance on Peers/Equity
- Emotions
- Recommend
- Problems
- Improvements

Jigsaw (Alternative Pedagogy)

*I would highly recommend that this project is used again next year as it was highly enjoyable and gave **a different approach to learning something new.***

*Overall I thought the jigsaw exercise **was a different and innovative method of learning and one that I hadn't experienced before.***

Overall, I thought the Jigsaw approach to learning was **satisfactory and a unique way in learning something new.**

The Jigsaw Book project is something I've not really done before. I've worked in groups before, but not as part of a team reading different chapters of a book and reporting about it, that part was new.

Overall from participating in the Jigsaw Coursework, **I definitely feel I have gained new knowledge through previously unused methods.** I liked the idea of sharing information through discussion and flipped learning and felt it encourages more participation from everyone involved.

Personally, I very much enjoyed the **book jigsaw task and was interested by a way of learning I had never done before.** The task also meant that students were required to work together and not individually which was another aspect of the task I enjoyed as I feel there has been very little chances where students have had the chance to work together.

The experience of the Jigsaw Book was something that happened first time in my years as a student, and I think that it a great way to understand the thinking ways of your classmates and try to communicate with them. We had almost the same notes that showed me that we actually have the same thinking about what we consider important.

The jigsaw activity was a well thought out idea. At first I wasn't quite sure what to do as the instructions were a bit vague, to me at least but when I met up with my group the goal became quite clear to me.

I thought the book jigsaw assessment was overall **a really useful experience especially for 1st year.** It allowed me to meet new people within my year group as well as in older year groups in order to share ideas about both the assessment and university life in general.

I find the "Jigsaw" method very useful as it unites the group in a working environment and helps to tackle a task together. It worked very well in our case as everybody was prepared and knew what to do. I can however see how this approach can be unsuccessful due to people not putting enough effort into extracting information and in some cases, would be better for individual work.

Overall I think that the Book Jigsaw Assignment was a good assignment and didn't have any real negative points to it. It helped with how I viewed the subject and introduced me to the university style of group tasks and having to work with strangers.

***I feel the Jigsaw coursework was fairly worthwhile.** It not only helps you get to know other people in your class but encourages shared learning and shared ideas. The 'expert' group allowed different options to be expressed within the same chapter. Something that I noted down wasn't particularly something that one of the other guys found interesting or important and therefore we could collaborate all our knowledge on the one chapter.*

***I found taking part in the book reading jigsaw activity to be extremely helpful and a good way to experience a new kind of peer learning.** I find that it is really well placed at the start of first year as it allows students to meet new people on the course. It gives a great overview of the history of the profession we will study for at least 4 years and eventually go into. It also works as a great incentive to learn more about the Institution of Civil Engineers and join as student members.*

***Overall the jigsaw idea was interesting to me and I felt it was a good way** to introduce an important book to the students by getting us to read a single chapter while being able to learn more from the book than just what we read. It is a better way to get students to read a book than just saying at the beginning to read it and do nothing with what they have just read and learned. It was also a good way to get an understanding of what the book is about and what can be learned from it.*

Reading

***Reading the chapter was no problem at all because I found myself reading it with interest rather than the feeling of being forced to do so.** Taking notes of the key points of the chapter helped me to understand the passage even more as I was constantly taking breaks to reflect on what I've just read.*

***First of all the reading of a book is always something special and for some people is a way of life.** I am one of those people so undeniably it would be a great experience for me as I was going to learn many things about my future job, Civil Engineering.*

***Also the book itself is a great read and as a result I have continued reading** some extra chapters in my spare time to help me learn more about civil engineering in society.*

Another aspect of this course work I enjoyed was the reading. I still believe reading to be a key learning technique and much prefer reading a book than reading from a computer screen. Getting the class to read the book is a great push start to beginning to read other things about Civil Engineering.

At the beginning when we were in class I thought this was going to be a huge waste of our time. We had already been learning about the ICE for a fair bit and this seemed like we were

just going to read and confirm what we had already been told. **However, the book actually went into a fair bit more detail than I had anticipated and as a result I found that I actually enjoyed reading it.** I opted to read chapter two, purely because I was the first one in my group to begin reading it and found myself actually wanting to read on a bit as one of my friends had read all of the chapters and had said that the book gets better the farther into it you get. I ended up reading more than just my chapter to see if this was the case and to be honest, I found it rather enjoyable.

I read Chapter 4 for this exercise, which was about Education, Training and Membership over the history of Civil Engineering. **I found the section on the Tay Bridge disaster to be particularly interesting, as it's something that I've always been curious about. Overall I found Chapter 4 to be interesting and insightful,** and I was glad to be given the task, as it's a text I'd have been unlikely to read otherwise (i.e. for pleasure).

As well as **making the reading of the book more exiting,** the random picking of groups has ensured that we had to interact with new people, this meant that we got to know more people that are going through the same stuff as us. **The exercise also was effective in encouraging reading amongst student. This is because once I starting reading something I found that it wasn't as bad as it seemed so continued to read beyond just my own chapter,** I would recommend this for other lecturers to use as it's a more interesting way of learning.

When I first set about reading my chapter for the Jigsaw exercise I dreaded having to write my overall summary **as my section on professional conduct was quite a dry read.** Despite this, compiling notes on the chapter was an easy enough task in itself – I was more worried about the public speaking aspect of the exercise.

If the book that was to be read was more interesting it would have been an interesting and fun experience. However I spent half an hour reading 36 pages about a magazine and how it has developed. The first page summarised it all, the magazine was bad then good then bad again.

As I delved deeper into the project and began reading my own chapter I began to learn a lot more than expected. I enjoyed the fact that I was always learning whilst carrying out this project and that the book explained things in great depth. I didn't like the fact that we were given the exact chapters to read from the book and that we weren't allowed to pick out our own. **I found that the chapter that I read was rather boring in some places** and this could have been changed if I was allowed to pick another.

I'm not normally an avid reader, although I found reading these chapters very informative and enjoyable.

*I read all 4 chapters of the book as it was interesting to find out for myself what the book had to offer. **I am not as big a reader as I used to be so I felt this was a valuable way of using reading as a main learning resource as I understand its importance throughout university**, and that reading can be for both educational merit and pleasure, ideally a mixture of both.*

*By using this technique of study, it meant I didn't have to note take for all four chapters, which would have been rather time consuming. **Despite this I did read an additional two chapters for enjoyment prior to the project.** I feel I enjoyed this as there was much less pressure and I had time to research further into parts of the chapters I found to be of particular interest as I didn't have to take notes. I certainly prefer this method to working completely independently and reading the four book chapters myself, making notes on all four myself.*

***The time spent reading the chapter was enjoyable** as the chapter I chose (chapter 6) was engaging and entertaining to read. **Reading a chapter in this way helped me develop my critical reading skills which I have found slightly challenging in the past.** Participating in the expert group was helpful as it allowed me to share views on the chapter and see different points of view on the information read.*

Enjoyable / Interesting

*Even though I was unsure about this project at first it turned out **to be very interesting and enjoyable.***

*It was an **enjoyable exercise** and I would also recommend that other tutors try it out with other books or hand-outs as it has proven to be a valuable way of learning.*

*I'm not normally an avid reader, although **I found reading these chapters very informative and enjoyable.***

*I ended up reading more than just my chapter to see if this was the case and to be honest, **I found it rather enjoyable.***

*The use of groups makes the task easier and more **enjoyable** and everybody has different points of view which may be a negative; different ideas of what the book means, but also positive; this leads to further discussion throughout the group*

Overall, I felt that this was **a very enjoyable experience** that helped me feel right at home with, not only university life but life in the course.

Another positive was that I found the **book enjoyable** so reading my chapter wasn't a painful task.

I found this task enjoyable and allowing each individual to focus on one specific chapter was a better method than if you were to read all four chapters. The timing for the task was great and we were allowed plenty of time to read and gather information on our chapters.

Overall, I think that the jigsaw approach to learning is both **enjoyable** and beneficial to students.

The time spent reading the **chapter was enjoyable** as the chapter I chose (chapter 6) was engaging and entertaining to read. Reading a chapter in this way helped me develop my critical reading skills which I have found slightly challenging in the past

Fun

I found this Jigsaw coursework very pointless but a good idea in theory. **If the book that was to be read was more interesting it would have been an interesting and fun experience.**

The task was great and **was a fun way to learn** and I believe most of the students would have preferred this rather than reading all four chapters and writing a report.

I found the jigsaw coursework to **be quite a bit of fun.**

Working as a group was fun but understanding that we are all individuals improved the quality of learning in the group as other people had different approach and method of teaching similar content.

Overall, I think that the jigsaw approach to learning is both enjoyable and beneficial to students. I would recommend it for use in first year groups in particular as I feel it was a good way to get to know other students and be more comfortable in the classroom environment. **The approach turned what may otherwise have been a tedious coursework into a very fun and worthwhile learning experience.**

In conclusion **I felt the activity was fun** and connected myself with a larger variety of people which normally I would never interact. Unfortunately the fun in this activity also uncovered some fundamental flaws in our group and in group work generally.

I believe that while the project was fun and worthwhile, things such as the essay at the end and the potential problems that could arise make it a bit less fun that it could be.

*Overall, I would recommend this to future first years. It's a good opportunity to get to know new people but **also makes learning that little bit more fun.***

*I found the Jigsaw Project to be a very useful exercise, by learning about the different chapters from class mates it made learning about the different chapters from class mates **it made learning about 'insert book title' fun and easy.***

New Knowledge

I think every civil engineering student should read this book in order to know what he/she is involving in. I feel more confident to talk about ICE and would be happy to get involved in different activities organised by the Institution.

*When I started reading my chapter I saw the assignment from a different perspective as I thought this was not going to be particularly interesting. **However, by the time I came to the end of my chapter I had acquired a lot of knowledge, which positively changed my point of view of this assignment.** It was fascinating to discover how the ICE was established, and what the institution has accomplished over the years. Another interesting point was the role of civil engineering in society, the responsibility it carries and the complexity of the problems which need to be solved.*

***Learning through reading books connected to the title of the class and then sharing knowledge with peers is an effective way of acquiring knowledge.** However, I did not enjoyed it as much as I should. In my opinion the choice of the book focusing mostly on ICE was not the best. I understand that the organization has huge impact on engineering in Scotland, although remembering all the facts does not help me in becoming a better engineer. I would rather read a book which will give me the knowledge about the connection between civil engineering with the environment.*

*Although the idea behind the exercise was to use notes you had made on your given chapter and notes from your peers to summarise the four chapters, I did find it necessary that I read all four chapters myself. I would say that having to do this would be a negative for the jigsaw approach to teaching but also that upon reading all four chapters, I was very glad to have my peers' notes to help me in my summary. **Despite finding the reading itself hard to get through, I believe the content to be knowledge essential to a civil engineer and that knowing the history behind something you wish to be a part of is very important.***

Self-confidence

Overall, I would say that **this task did increase my confidence** in delivering new information to people as it forces you to confront any anxiety you may have about this. Knowing that the others in your group haven't read your chapter gives you the freedom to say what you have learned without worrying if they think you are right.

The chapter I read encouraged me to do some further reading on the people involved in the ICE and its development such as the first president Thomas Telford. **This improved my confidence greatly** as it helped me understand the chapter better and in turn I could expand on points when talking about my chapter to my peers.

It's also improved my confidence in a social way and I feel less anxious about speaking with other people than I did previously.

Also, **you gain confidence** when you know more about the atmosphere you are getting into when you are a first-year student.

Comparatively, you could argue that this exercise increases your ability to work in a team environment. This would be ideal for any type of engineer as a team environment would be something you'd need to be comfortable with. **I also believe it improves your confidence and your ability to outline/express information to peers and co-workers.**

This is because each member of the group took down different notes so it helped expand my knowledge. This also **helped increase my confidence** for reporting back to the little buddy group as I was comfortable with everything I learned and had a good understanding of the chapter I read. **It has increased my confidence** in communicating my ideas with others because I was shown respect and felt like people enjoyed listening and learning about what I had to say about my chapter

Although initially hesitant about reading aloud what I had gained from my chapter learning, **I felt my confidence in teaching skills certainly increased.**

Another useful benefit is the exercise of being able to find the key facts in a text and use a variety of paraphrasing techniques. I also think that **it improves the confidence of talking about knowledge one gained as numerous students have the fear of doing or saying something wrong.**

Reassembling back in to my little buddy group, I took on the role of a teacher by explaining what I learned to my **peers increasing my confidence in communicating my ideas to others.** Listening to my peers talk about their book chapter reading was an effective way to

learn. This helped me to take down detailed notes that proved to be of great use when coming to writing the two page account of all 4 book chapters.

I then had to present the information I had learned from my chapter to the other members in my group. **This increased my confidence I presentation skills** and allowed me to answer some questions about the chapter as well.

Sharing knowledge with peers allowed me to meet new people **and make me a more confident person.**

Communication Skills

I was more worried about the public speaking aspect of the exercise.

Participating in the Book Jigsaw has also helped **improve my listening skills** as I had to listen carefully to members of both the expert group and little buddy group whilst picking out key points and information.

The second part of the Jigsaw Book project – meeting with my group to discuss the chapters – I found productive. As this gave us a chance to meet new people on the course and also learn about each chapter everyone had read. This part of the project, I feel, **helped with my communication skills** and improved my confidence when speaking out in a group. Also, I have developed my **listening skills**, as we had to take in information from others and write our own notes.

I found this task an effective way to pick up new knowledge as well as practicing skills. Doing my own chapter allowed me to analyse information and pick out key points, thus **improving my note taking skills.**

I feel like I developed **valuable peer working skills like teamwork, communication and listening** through this exercise which I feel are valuable skill to learn for studying a challenging degree.

Overall this was a good experience and helped me understand the importance of communication and teamwork when working on a task as qualified engineers do. It also assembled the year together to make everybody feel comfortable when working on future tasks with students

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*This flipped classroom method allowed me to engage and communicate with my peers in order to obtain a set of strong, updated notes along with vast knowledge of my allocated chapter which in turn **improved my communication and listening skills.***

*The book jigsaw task allowed me to collaborate with my group **assisting in my teamwork and communication skills.***

*I also found that as I had to present my information to my peers I gathered a greater knowledge of it and was **more confident** in speaking about it.*

*I feel like **I developed valuable peer working skills like teamwork, communication and listening** through this exercise which I feel are valuable skill to learn for studying a challenging degree*

*It was a bit stressing the whole idea of letting someone else read the chapter for me, but as it went, I would really do that again because it showed me that I can trust my classmates, that participated. **Because this project was all about trust and communication between the class members.***

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Doing this project also help boost vital skills such as communication, teamwork and being able to read and find information.

As mentioned the task teaches skills which will be extremely useful in transferring from University to work life, such as: teamwork, co-operation, compromise, **communication**.

However, when I returned to the jigsaw group, there was confusion as to who had read what chapter – **communication was poor and had been from the off**. As a result I didn't learn anything from the others in my group and had to read the remaining chapters myself so in order to complete the report

Reliance on Peers/Equity

The project **provided a perfect opportunity to bond with members of the class that usually I would never thought of having contact with** and secondly teaching us to co-operate with new individuals.

It was a bit stressing the whole idea of letting someone else read the chapter for me, but as it went, I would really do that again because it showed me that I can trust my classmates, that participated. Because this project was all about trust and communication between the class members.

One point about this task that could be improved upon was that some students put in little effort and hardly contributed to the work, for example a member of my group did not attend the class and so we were unable to take notes on the chapter they had read and instead had to individually read their chapter, defeating the whole purpose of the 'flipped learning' process.

It also led to a good collaboration between students meaning that **you couldn't really afford to hold back and had to come out of your shell**, however it wasn't jarring as it was done a bit later in the semester meaning we had already met new people and settled in quite a bit.

The Jigsaw classroom was not effective at all as nobody was really prepared to talk about their chapter and some of the people were just chatting. I could really understand what their chapters are about when I had to read all of them to write the 2-page report.

Friends

The group project was a fantastic opportunity for new students to meet new people, and would **almost force it to reduce the awkwardness of meeting/ making new friends at university**, doing this whilst being kind of educational is a fantastic group project. The idea to make group to meet new people and interact whilst still learning is great.

Overall, I felt that this was a very enjoyable experience **that helped me feel right at home with, not only university life but life in the course. Since then I have made friends with some good people in and out of the buddy group.**

I like the idea of the jigsaw group project. **The group project was a fantastic opportunity for new students to meet new people, and would almost force it to reduce the awkwardness of meeting/ making new friends at university,** doing this whilst being kind of educational is a fantastic group project. The idea to make group to meet new people and interact whilst still learning is great.

On another note, the assignment **also helped to even bring the students together as friends.** This is very helpful when starting a new course and helps everyone to get on immediately.

Overall, I feel like the Jigsaw project has taught me a lot about the role civil engineers have had in society over the last 200 years, the development of the ICE over that same time and has **allowed me to develop new friendships with other students which I hope to maintain in the future.**

Also, the jigsaw project **allowed us to get to know a new group of people** as many of us who travel to university every day, like myself, feel that it is more difficult to meet new people and get involved in the many different activities that are going on. **By meeting new people through the jigsaw project, you feel more involved as during lectures you have different people to sit with and talk to.**

Listening to the other members have improved my listening skills drastically and made me more confident about talking to others. **I got to know other class members better and made new friends along the way.**

By working in groups I also managed **to get to know my group better and make more friends on the course which was one of the most appealing aspects to this project.**

The task also meant that students were required to work together and not individually which was another aspect of the task I enjoyed **as I feel there has been very little chances where students have had the chance to work together. The result of this is that most of students in the course have not been able to interact with each other and perhaps struggling to make friendships.**

The idea of communicating with class mates early on is great as it helps people make friends in the class, through these people that I worked with in the project a small group has

formed this is ideal as it makes it easier when I have problems with a certain aspect of the course as I don't have to go straight to a lecturer for help

This was also **a great way of meeting new people on the course** that I may have never talked to in my time I am going to spend at Strathclyde University.

I got to know other class members better and **made new friends** along the way.

Peers

It also **helped me meet my peers** in my class.

I found taking part in the book reading jigsaw activity to be extremely helpful and a good way to experience a new kind of peer learning.. **I feel like I developed valuable peer working skills like teamwork, communication and listening through this exercise which I feel are valuable skill to learn for studying a challenging degree**

I feel the jigsaw approach to learning is an effective way to learn new information on a subject from my peers. I don't know how it would work for something other than books or how effective that would be. But in this instance it was a good way of peer learning

This flipped classroom method allowed me to engage and communicate with my peers in order to obtain a set of strong, updated notes along with vast knowledge of my allocated chapter which in turn improved my communication and listening skills. Reassembling back in to my little buddy group, I took on the role of a teacher by explaining what I learned to my peers increasing my confidence in communicating my ideas to others. **Listening to my peers talk about their book chapter reading was an effective way to learn.**

Listening to my peers was effective because I was able to gather a wide range of knowledge on the role of civil engineers. It was also effective because individually, we didn't have to do much reading but learned a vast amount – it was time efficient.

The assignment also has the convenience of getting to know your peers better, which is especially important for first-year students.

To begin with, I think that the exercise alone was a very good idea. Learning through reading books connected to the title of the class and **then sharing knowledge with peers is an effective way of acquiring knowledge**

This task has definitely encouraged coursework with my peers and I think that this was the best way to do the task as if we were all on our own to read the chapters and write the report, we may have missed out key points from the book.

It was also important that everyone listened when peers were trying to share knowledge of their own chapter, as the notes were needed for the book report. This was also one of the negatives of the project, due to our own individual reports hindering on the work of the other members of the group. If they supplied bad notes I would have to read over their chapter and take my own notes, this ended up happening on a couple of the chapters but this was just to confirm the knowledge my peers had dictated to me, not because they hadn't taken good notes.

I felt this was a valuable and interesting way of learning some new information from my class peers

I have never liked group work until last year when I had to take part in it through various college projects so I feel more confident working in groups of my peers I won't necessarily know. However, I understand from the point of view of people who are not as comfortable in these situations. This task encouraged group work and this was good as it will be an integral part of our time at university and working. Learning from the rest of the members of my individual group was also a good way of learning new information.

Over the course of undertaking the book chapter jigsaw programme, I feel as if I have learned more by listening to my peer's views/knowledge on the various chapters compared to my own.

Although the idea behind the exercise was to use notes you had made on your given chapter and notes from your peers to summarise the four chapters, I did find it necessary that I read all four chapters myself. I would say that having to do this would be a negative for the jigsaw approach to teaching but also that upon reading all four chapters, I was very glad to have my peers' notes to help me in my summary.

Comparatively, you could argue that this exercise increases your ability to work in a team environment. This would be ideal for any type of engineer as a team environment would be something you'd need to be comfortable with. I also believe it improves your confidence and your ability to outline/express information to peers and co-workers.

Listening to my peers talk about their chapter wasn't the best or quickest way to learn. If everyone had read the four chapters on their own then I think people would have had a full understanding of what the text was about.

Emotions

*On the morning of the task I went into **class feeling relatively nervous**, more so to share my notes with those doing the same chapter as me rather than my own group who I'd been previously acquainted with. Although slightly more at ease in my own group, I did feel find responsibility of ensuring their notes on my chapter were at the required standard a bit daunting...After walking out of the classroom that morning I **felt relieved that my worries** were merely a product of overthinking the situation. I found that in both my own group and the expert group individuals were in the same situation as me and that communicating what I had learned was quite easy.*

Recommend

***Overall I enjoyed the book jigsaw task and would recommend it to other tutors to use as a way of learning to other 1st years.** It is helpful in encouraging students to work together and get to know each other. I would prefer this method to each student having to read each chapter individually as it's more enjoyable and saves time. The only negative and aspect that could be improved is making sure every student puts in an equal amount of effort as if one member of the group doesn't do the work it affects the rest of the group harshly*

***Overall I would certainly recommend carrying out this exercise again** to allow the students to gain knowledge of the background of civil engineering and also improve their presentation and listening skills when working in the groups*

*The exercise also was effective in encouraging reading amongst student. This is because once I starting reading something I found that it wasn't as bad as it seemed so continued to read beyond just my own chapter, **I would recommend this for other lecturers to use as it's a more interesting way of learning.***

***I would highly recommend the book jigsaw exercise for 1st year students next session as it is a good and effective way of learning.** It is also a good exercise because it allows students to socialise with other people on the course which is useful and will help them in the future. It was an enjoyable exercise and I would also recommend that other tutors try it out with other books or hand-outs as it has proven to be a valuable way of learning.*

***I would recommend the jigsaw method to other tutors,** as it cuts out a lot of the workload and makes the project more enjoyable.*

I would definitely recommend this task to any future years as it helps with a lot of skills, such as report writing and listening skills

*I feel the jigsaw approach to learning is an effective way to learn new information on a subject from my peers. I don't know how it would work for something other than books or how effective that would be. But in this instance it was a good way of peer learning. **I would encourage this method to be used again with first years next year and perhaps in other classes where the source material is similar.** It encourages the importance of reading throughout this course and also encourages group work, both during university time and in our own time.*

*Being an international student the jigsaw task brought me some difficulties, basically, with language understanding. But during the process of reading I used the dictionary what helped me a lot to translate and cope with the meaning problems. To be honest, it definitely increased my language skills and broadened my vocabulary (both engineering meanings and language). **That's for what I would recommend this exercise to next 1st year students, especially, for those whose mother tongue is not English.***

Problems

*I thought the jigsaw book project was a bit of a waste of time. The time allocated for the project was far too long – it should not have been given a whole semester when it could have been done in a couple of weeks. **I fail to see how this is so important to learn, especially in the form of a book jigsaw project. I would have been happy with a couple of lectures on the contents of the chapters. The contents of chapters two and three are meaningless and not what I came to university to learn about. I thought that the expert group was pointless as I had already summarised the contents of the chapter and no new knowledge was presented by other people.***

*I found this Jigsaw coursework very pointless but a good idea in theory. If the book that was to be read was more interesting it would have been an interesting and fun experience. However I spent half an hour reading 36 pages about a magazine and how it has developed. The first page summarised it all, the magazine was bad then good then bad again...**The collaborative learning side of the task was a good idea and it helped me to meet and talk to other people that I may not have spoken to if it was not for this. However I think we would all agree that the subjects of our discussions were very useless and boring.***

The chapters were interesting, but seemed to be unfairly sized, as one group member only had to read a few pages whereas another had to read a great deal more. On the

day we did the group talking in class, only two of our group showed up, including me. This meant I had to do more work than other groups as I had to read three chapters plus skim a fourth when writing the two-page essay, which was time consuming. Writing the essay was harder than expected as it was drastically different to anything previously done in secondary school, but this also made it good practice for writing essays at University.

Improvements

Doing this project also help boost vital skills such as communication, teamwork and being able to read and find information. **I think an improvement that could be made on the project would be to have an early hand in date on the book report as I found that I was doing it around the time of more important work like tests.**

I believe that if there'd been better communication within my jigsaw group, I'd have found this exercise to be more beneficial to my learning and an enjoyable experience; unfortunately though it was spoiled by a lack of coordination. **I'd recommend this exercise for 1st year students next season on the basis that the jigsaw groups were better informed, perhaps by being assigned a chapter by a more systematic approach (i.e. by surname).**

One thing that can be improved is to make the students read the four chapters instead of their own. The Jigsaw classroom was not effective at all as nobody was really prepared to talk about their chapter and some of the people were just chatting. I could really understand what their chapters are about when I had to read all of them to write the 2-page report.