Differentiation and Diversity Workshop

In this workshop we organised three activities which were designed to discuss issues relating to student diversity and the challenges this brings to education providers. In this document we have reproduced all the feedback collected from the delegates. Towards the end you will find all the materials that we used. In the workshop we were lucky to have delegates from a wide range of academic disciplines, including chemistry, biology, horticulture, marketing, health and social care, nursing, physiotherapy, management, maths, engineering, and electronics.

What is apparent from these comments is that nearly all course organisers acknowledge that there is a diverse student population, some with previous studies in an area, others who are studying the subject simply as a third subject, and that this results in a diverse student group with varying needs and motivations. There is, however, large variation in how this issue is addressed, with some tackling the issue head-on and others still to trying to formulate a strategy for how best to deal with it.

Activity 1: Feedback Sheet: How does prior subject knowledge affect the level 1 teaching experience?

Delegates were asked 3 questions. Here are their responses

Are students with different levels of prior knowledge a problem in your subject area? If so, in what way?		**How is this currently addressed?**	**What do you think are the most important issues for you about students with/out prior subject knowledge in first year?**
Chemistry	Chemistry at level 1 is a co-requisite for most students doing a degree in biological and life sciences. I'm not sure they all realise this at the start.	Redesigned level 1 to make two separate courses: for life sciences and physical sciences	optional drop-in tutorials help with students with little/no prior knowledge
	Range of students with school qualifications	course more focussed on their degree intention - more content and applications based	still need to think about engaging/challenging the students with lots of prior knowledge
	Range of motivations, "I'm a biologist, why do I have to study chemistry?"	but still have a range of abilities within each class	
	Many students said it was too easy. We perhaps concentrate on students at the bottom.		
Biology	Celebrated rather than a problem		
	we use the differences in prior knowledge and CULTURE and experience to open dialogue about learning expectations, what the individual wants out of HE, how they can make use of resources to create their own learning path etc.,	by encouraging students to think about the above. By acknowledging that some will be bored at certain times, but also showing them how they can engage differently and at a higher level via e.g. project work.	Subject knowledge is less important than cultural differences, and in personality etc.

L1 Biology	yes, either can't follow the course or bored, but the biggest problem is lack of awareness and reflection	advisors and tutorials to find out from students and address case by case	whether the lack of prior knowledge is critical to their studies. If yes, then perhaps send to more modules to catch up
Education	Different levels of prior knowledge contribute to the diversity in a class. Bottom line needs to be that everyone has something to contribute and everyone has something to learn, but you need to create that environment	see previous	how we take prior knowledge into consideration, rather than pretending it doesn't exist. How can we capitalise on this for the benefits of other students? How can academic staff have differentiated expectations to support the least able/experienced while challenging the most able?
Horticultural Science	Prior education - NC or Higher/A level i.e. practical or science	support the students who are weaker in science, but difficult to fit this in	students with no practical experience can't relate the science to practice initially
	course involved practical horticulture and science students may be demotivated about half of the course especially in term 1 which is really when we want them to be excited and getting going with the course	looking for ideas	students with less science background struggle
		all students already to a work experience placement in year 1	May need to change entry requirements, but widening participation is core in our institution
Marketing	not so much a problem but mindful that some do feel they have "done it" before and others less confident	encourage those with knowledge to lead and discuss	try to think of them as individuals and bring strengths to the fore
	Diverse student group, not just in prior knowledge but culturally and socially		
Health and Social Care	No students are guided to resources from basic understanding of the subject and if they prefer they can access other resources which can challenge them		The opportunity of creating opportunities where they can learn from each other
Physiotherapy	generally not a problem. All have an aptitude for studying science (entry requirements). Even where they have prior knowledge (e.g. degree in anatomy or physiology) they often don't get exemptions as they have not APPLIED the subject. However, would be very useful to explore the student's perceptions as the GU presenters have done	for some modules we offer additional optional tutorials (for students who feel they require this).	
Nursing	Yes, some from school, some from previous degrees, access programmes, work	make use of prior knowledge in class	more of the issues are with the level of academic skills; such different levels coming in but also the need to keep academically able students engaged and motivated without losing others
	different experiences of higher education; level of face to face teaching; class size	further work and engagement; wider and more challenging	

STEM	yes; demotivation	different areas of Bloom's taxonomy; applications; creativity	motivation; engagement; disruption; interest; attainment; retention
Management	yes, some to college and studied the topic	independent learning	
Maths	yes, from school	self-paced	lack of application; fear
Electronic engineering	Yes, maths competency is a ubiquitous problem	Maths provides additional support for strugglers.	Promoting: motivation and interest; willingness to learn; openness and willingness to challenge understanding
	But students who have studied electronics at a level pose a particular problem - they think they know it all (they don't) and therefore do not put the effort in	Electronics A-level - problem - you can tell them but they don't listen. Assessment is the wake-up call	These are issues both for students who (think they) know too much as well as students who (think they?) know too little

Activity 2 Feedback Sheet: How can we teach effectively when faced with different levels of student engagement?

	Are students with different levels of engagement a problem in your subject area? If so, in what way?	**How is this currently addressed?**	**What do you think are the most important issues for you about students with different levels of engagement in first year?**	**Prior knowledge & student engagement: do you think that these are the same or different problems?**
Chemistry	boredom at the top	support for weaker students - drop-in tutorials	retention	different
	weaker students probably get more staff time	smaller group tutorials for 'intending chemists'		knowledge and understanding
				engagement can affect all students
biology	students are definitely engaged at different levels, but it doesn't really cause a problem in our teaching. I address aspect of the affective domain and dispositions in course design	For example, coursework tasks are highly variable. Yes we have lab reports, a standard for the discipline. However, there will be tests requiring oral interactions (debates, interview, presentations), creation of AV/Visual resources (posters, films) and analysis/application with choices of context		connected, but not the same

L1 biology	engagement levels are spread across a spectrum from very disengaged to very engaged	not very well, ignored mostly	perhaps not taking the requirement/lecturer/tutor serious enough. Teachers need to show that they care about the students as individuals and care about their engagement as much as any other student		closely related problems for sure
education	yes. Lack of engagement can (and often does) impact on progress. It is also demotivating to those around them.	varied pedagogy in lectures and tutorials. Demand that everyone contributes in some form during the module. Opting out is not an option!	Where the problem stems from. A lack of engagement can be due to a lack of confidence, stress about the method of delivery etc., sometimes there is a lot more going on behind the board expression on the face!!		completely different. Some people have a wealth of knowledge and are completely disengaged. How do you know who has what prior knowledge and the quality of that knowledge? Very engaged people don't necessarily have a depth to their thinking!
Horticulture	many work too much leaving little time to devote to their course	Difficulty - sometimes have some classes which they must compulsorily attend	Division between high and low achievers may widen (but this tends to close again in year 2 as motivation rises).		different, but can sometimes be connected
	HND & BSc registered students are taught in the same class - they may have different aspirations - this is not a problem later	Mostly we want to encourage HND students to aspire to higher achievements so partly ok. Both of these may lead to not pushing the students to achieve at as high levels as would like.			
maths	yes, some resent having to do maths when only just want to make things	not really addressed yet, but planning to have more directly applied problems to show relevance of maths	making maths relevant to technology teaching		related - unengaged students tend to have low prior knowledge)
health and social care	sometime. They can feel frustrated that they don't understand what is being taught or that they feel that they would like to know more	study support or providing additional resources which can challenge them	that they get a sense of achievement whether it be with new information or consolidating their knowledge		they can be interconnected - prior knowledge can lead to lack of/poor student engagement

physiotherapy	yes, some are more motivated than others	tutorials (rather than lectures) where the tutor can prompt participation	withdrawal from the programme	
		online discussion could help - students sort themselves out into different conversational 'threads' according to their ability	lack of achievement	
			effect on other students	
nursing	yes, seem disengaging from class discussions 'know it' 'done it before' overwhelmed by HE systems, processes, size, demands,	developing teaching activities that draw on existing knowledge and skills promote discussion and debate smaller groups, face to face, and online	not leaving people feeling isolated	
			providing a variety of options and opportunities to contribute (safe environment)	some areas the same but others different
				engagement or lack of it can be more to do with external demands
STEM	yes; anger, de-motivational, confrontational (sometimes)	mentoring; students leading groups	motivation, satisfaction; student-teacher responsibilities	they overlap
maths	not engagement as such because if they don't wish to come they have made a choice and we may not be adding Sufficient value for them	trying to add value in terms of application of knowledge and concentrating less on knowledge and more on skills development	adding sufficient value for all	not same problem
electronic engineering	exactly as illustrated in your scenario!	not well - need to move to flexible learning and flexible support	challenge - support	different

Activity 3: Solutions Feedback Sheet: How best to meet the demands faced by students with prior knowledge or different levels of interest

What were the main issues raised in your discussion?	Wilk	Jigsaw	What are the most important points, positive or negative, that emerged from your discussion?
concern about the limited experience a student using the WD would get by failing the exam and not having time to spend on the project. Good that student has time to address weaknesses but not if it puts limitations on the student's experience	2	5	we have to be realistic. We can try to address the problem but the people will still be there! Very able and motivated people won't stop being all of these things regardless of the intervention. Lesson from early intervention work in Glasgow primary schools - everyone gained from interventions so the learning gap stayed the same or was similar
	3	4	facilitation: make sure the student lead learning are up to a high standard and knowledge are shared properly. WD seems to require a lot of staff time
	1	3	need a variety of approaches
different subjects; diagnostic tests needed (that are robust) special project may not be motivating	4	5	students have more control over their learning
	5	5	
approaches may work better depending on subject matter	5	5	
WD - time consuming but does ensure that students are learning. Chance to rectify things before the end of the module. Jig - students do varying amount of work. Therefore transferred knowledge may be patchy. Students may not be competent teaching others even if they understand the subject matter	3	4	
WD - nice for strong students, awful for weaker students. Some student will be increasingly demotivated by never moving to the application phase. Jig - sounds promising. There will be differences in how much students drill down to understand the topic assigned to them. student, in teaching their section, will really know it well. student gain confidence in team work, giving presentations and participating in discussions	2	5	
Wilkinson approach would increase the divide and not give students who fail the 70% benchmark never get to the application but which can be more rewarding	1	4	Liked the jigsaw method - student engagement up and the checking outwith the group helps with confidence and responsibility and more useful in my area of study

Not all student get the same experience. Module content different for different students (WILK) divised(?) for the class (WILK); engage students relative to their ability (WILK); learning experience for others very dependant on student ability (JIG)	2	3	
WILK- demotivating for more than 70% of the students; a project might actually be a good way to learn the basics; JIG - student not presenting the right info; lack of participation	3	4	caters for students at the top; student's reaction to non-trad. teaching methods; management/admin issues
Logistics, potential demotivating for some, but good for others; interdependent of student grades?	3	4	
group support and motivational; clear tasks and with it clear responsibilities	3	4	case study B - peer learning and motivation link between the segments; self-motivation, sense of group achievement, negative - dependent on being able to study your topic

OVERALL AVERAGE

Wilkinson design – 2.8

Very promising	5	4	3	2	1	Not useful at all

Jigsaw method – 4.2

Very promising	5	4	3	2	1	Not useful at all

Workshop evaluation: Results from participants

Was this workshop useful? (please circle) – **AVERAGE 4**

Yes	5	4	3	2	1	No

Was this workshop enjoyable? (please circle) **AVERAGE 4.2**

Yes	5	4	3	2	1	No

If we ran this workshop again, what would you recommend that we do differently?

looking for solutions - didn't really get any - maybe on website. Good chat with people though
give more people the opportunity to share ideas so all contributors have heard more ideas, but thank you for the URL that might help with this
do a summary at each section, given you already collected feedback now; you should have some good ideas to share next time
tell us what you did

more ideas from the researchers
set up for round-table discussion; change groups throughout; 3 per group
interesting to hear about the different subject areas; it would been useful to have case study A; as it was difficult to understand what this model was about without seeing a summary sheet
larger groups, so more scenarios5
nothing!
time for everyone to give their ideas/best practice

WORKSHOP MATERIALS

Activity 1: How does prior subject knowledge affect the level 1 teaching experience?

You can record your personal thoughts on this sheet.

Some questions for you to consider in relation to your course

- What proportion of your students have studied your subject, either formally or informally, before coming to university?
- What differences, if any, are there between schools versus university in the way your subject is taught?
    - If there are differences, what challenges do these students face in adjusting to studying your subject at University?
- Should you assess prior knowledge at the start of the course?
    - If so, how would you use this information?
    - If not, why not?
- Are some of your students bored with the course because they have studied it before?
- Are some of your students struggling because they don't know what's required of them in the subject?
- Do you rely on some prior knowledge (even implicitly) for student's to succeed in first year?

Activity 2: How can we teach effectively when faced with different levels of student engagement?

You can record your personal thoughts on this sheet.

Our student rep Seval has a passion for psychology. She came to university to study psychology and it's her intention to study the subject to honours and ultimately to work as a psychologist. She is achieving A grades across all elements of the course, always has her work done for tutorials and asks lots of questions. She has requested more staff-student interaction, more detailed reading lists, and opportunities to work as a research assistant in the School. She is involved in the Psychology Society and is proposing the introduction of a psychology film club in the School.

Katie is in the same tutorial group. She wants to study creative writing to honours and wants to become a script-writer. She wasn't sure what psychology was, but had heard that it was an easy course and thought knowing what makes people tick would be useful for her chosen career so she chose it as her third subject. Nobody warned her that psychology would include statistics and she hates them, tutorials and labs. She wants to devote her energies to her main honours subject and so she only does the minimum required to pass the course, never does the prep work before tutorials or labs and never wants to contribute in class.

Ben can't believe he is in University – he is the first in several generations of his family to come to university. He loves all his first year subjects but is struggling with the work load and the amount of reading he needs to do. Particularly as he is having to juggling this with a part time job that he needs to fund being at University. He doesn't always have time to do all the prep work for tutorials and sometimes feels lost but is too embarrassed to say so. He works really hard and tries to address the feedback from tutors but his grades seem stuck at a C and he is frustrated.

Seval is very angry about being in a tutorial group with Katie and Ben, she feels that the tutor addresses activities to the weakest member of the group, and that Katie doesn't contribute enough to group activities and this is negatively affecting her educational experience. Katie thinks the tutorials are a waste of her time and wishes she didn't have to go. Ben wishes they would explain things more clearly and reduce the workload involved so everything didn't feel so rushed.

Discuss in your group:

What are the main issues faced by course organisers here in course design and organisation?

Further questions to consider:

- How do the demands differ between these students? How can we meet these differing learning needs?
- Is it important to ensure that we don't teach to the middle – what strategies can we use to ensure our activities are both 'high ceiling/low threshold' i.e. include challenge for those that require it but are also accessible to those who need additional support.

Activity 3: Solutions: How best to meet the demands faced by students with prior knowledge or different levels of interest

You can record your personal thoughts on this sheet.

You have been given an outline of one way of possibly addressing these problems.

Your colleagues in the group will have other possible solutions.

Part 1: Beginning with your own course,

- Would this solution work?
- What issues would it not/solve?

Part 2: In pairs,

- Compare the different solutions; is one solution better than the other and what are their relative merits?
- What other solutions to these problems could there be?

Activity 1: Feedback Sheet: How does prior subject knowledge affect the level 1 teaching experience?

Please complete this individually.

What is the subject area you are thinking of when completing this activity? _____

Are students with different levels of prior knowledge a problem in your subject area? If so, in what way?

How is this currently addressed?

What do you think are the most important issues for you about students with/out prior subject knowledge in first year?

Activity 2 Feedback Sheet: How can we teach effectively when faced with different levels of student engagement?

Please complete this individually.

What is the subject area you are thinking of when completing this activity? _____

Are students with different levels of engagement a problem in your subject area? If so, in what way?

How is this currently addressed?

What do you think are the most important issues for you about students with different levels of engagement in first year?

Prior knowledge & student engagement: do you think that these are the same or different problems?

Activity 3: Solutions Feedback Sheet: How best to meet the demands faced by students with prior knowledge or different levels of interest

What were the main issues raised in your discussions?

As solutions how promising were the:

Wilkinson design

Very promising	5	4	3	2	1	Not useful at all

Jigsaw method

Very promising	5	4	3	2	1	Not useful at all

What are the most important points, positive or negative, that emerged from your discussion?

Workshop evaluation:

Was this workshop useful? (please circle)

Yes	5	4	3	2	1	No

Was this workshop enjoyable? (please circle)

Yes	5	4	3	2	1	No

If we ran this workshop again, what would you recommend that we do differently?

Scenario A: Judy Wilkinson course design for Maths for Engineers

This is one interesting course design of several. Your task is to read this, and begin to consider whether or not it seems likely to solve the problems brought out in the discussions around the first two exercises. You should then explain it to the others in your group and initiate a brief discussion on this. You have only 5 min.s self-preparation time, then 4 min.s each to share and discuss each of the possible solution-designs.

Judy Wilkinson (2001) designed and implemented a course of Maths for Engineers: a first year course. It is unusual in being designed to address both breadth and depth aims in a single course design: both achieving minimum competence for every student for every concept or topic, and going beyond that for deeper learning whenever possible. The course ran throughout the academic year, and was divided into blocks of 6 weeks each. Each block began by mainly lecture expositions and skills exercises, and there was then a competence test at 3.5 weeks. If students did not reach the required level of 70% correct, then they had the remainder of the block for addressing their shortfall, and retook the test. If they had passed, then they could focus on the mini-projects (weeks 5-6) which addressed deep learning by applying the material in small groups, supported by a tutor. The projects either began with a physical experiment which was then modelled mathematically, or with a given math. model and used software to solve the equations and graph them.

Weeks within each block (of four)	**Hours**				
	1	**2**	**3**	**4**	**5**
1-3	Lecture	Lecture	Lecture	CAL	Tutorial
4	Lecture	Lecture	**Test**	CAL	Tutorial
5	Project	Project	Project	Project	Tutorial
6	Project	Project	Project	**Resit** / Project	Tutorial

(N.B. this is clearly a relative of Bloom's Mastery Learning design (Block, 1971), which at school level divided courses into blocks of 1 or 2 weeks; did a formative test; followed by personalised self-remediation based on the diagnostic information from the test; and retaking the test.)

Scenario B: Jigsaw

This is one interesting course design of several. Your task is to read this, and begin to consider whether or not it seems likely to solve the problems brought out in the discussions around the first two exercises. You should then explain it to the others in your group and initiate a brief discussion on this. You have only 5 min.s self-preparation time, then 4 min.s each to share and discuss each of the possible solution-designs.

(Significant parts of the following text are taken from Honeychurch (2012)).

This is an important and strong form of student-generated teaching, invented by Aronson in 1971. The idea is that the teacher does not teach the subject matter content, but divides the class into teams, each of which researches a topic, and teaches it to the rest of the class.

Just as in a jigsaw puzzle, each piece — each student's part — is essential for the completion and full understanding of the final product. If each student's part is essential, then each student is essential; and that is precisely what makes this strategy so effective. Here is how it works: The students in a history class, for example, are divided into small groups of five or six students each. Suppose their task is to learn about World War II. In one jigsaw group, Sara is responsible for researching Hitler's rise to power in pre-war Germany. Another member of the group, Steven, is assigned to cover concentration camps; Pedro is assigned Britain's role in the war; Melody is to research the contribution of the Soviet Union; Tyrone will handle Japan's entry into the war; Clara will read about the development of the atom bomb.

This technique forces all students to depend on other students in their group. It can therefore engage all students, regardless of their interest or ability, by creating an environment where the more motivated students take control of their own learning initially, then teach others what they have learned. The fundamental difference between this and conventional teaching is that only the learners, not the teacher, function as a subject matter expert and source of knowledge. The fundamental difference between this and other methods of group work is that each learner is a member of two different, cross-cutting, groups: a Jigsaw group for reciprocal teaching and an expert group for preparing the teaching they must do themselves.

Aronson's way of summarising the design (adapted for this context) is:

- Students are divided into a 5 or 6 person jigsaw group. The group should be diverse (e.g. in terms of prior knowledge and/or level of effort).
- The content is divided into 5-6 segments (one for each member)
- Each student is assigned one segment to learn. Each student should only have direct access to their own segment.
- Students should be given time to read over their segment at least twice to become familiar with it. Students do not need to memorize it.
- Temporary experts' groups should be formed in which one student from each jigsaw group joins other students assigned to the same segment. Students in this expert group should be given time to discuss the main points of their segment and rehearse the presentation they are going to make to their jigsaw group.
- Students come back to their jigsaw group.

- Students present their segment to the group. Other members are encouraged to ask questions for clarification. This is small group, dialogic teaching.
- A test on the material should be given at the end so students realize that the sessions are not just for fun and games, but that they really count.

References

Aronson's Jigsaw classroom.

Aronson,E. (1978) *The jigsaw classroom* (Beverly Hills: Sage).

- Website, Aronson papers, etc.

Ann Brown (1992) has applied it successfully for Biology in US high schools, and with a somewhat different theoretical emphasis. (References to some influential papers by her are in wikipedia.)

Baxter (2007) "A Case Study of Online Collaborative Work in a Large First Year Psychology Class" Case study Jim Baxter's redesign of a first year psychology course used in part a jigsaw design in a class of 550 mediated by a VLE.

Draper has used a version of Jigsaw, mediated by a VLE (moodle), in a Positive Psychology course. You can login as a guest to the course's moodle site and inspect the wiki pages produced as startup learning materials by the class for the class.

Honeychurch (2012) describes her successful use of Jigsaw in a level 1 philosophy tutorial group (with mixed motivation, and mixed prior knowledge).

Some references for the "Differentiation and Diversity" workshop 13 June 2013

Aronson,E. (1978) *The jigsaw classroom* (Beverly Hills: Sage). http://www.jigsaw.org/

Baxter (2007) "A Case Study of Online Collaborative Work in a Large First Year Psychology Class" Case study Jim Baxter's redesign of a first year psychology course used in part a jigsaw design in a class of 550 mediated by a VLE.

http://www.reap.ac.uk/reap/reap07/Portals/2/CSL/t1 - assessment and the first year experience/effective feedback to 550 students/Online_collaborative_work_large_first_year_psychology_class.pdf

Brown, A.L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of the Learning Sciences*, 2(2), 141-178

Block,J.H. (ed.) (1971) Mastery Learning: Theory and practice (New York: Holt, Rinehart & Winston)

Carroll,J.B. (1963) "A model of school learning" Teachers college record vol.64 pp.723-733

Carroll,J.B. (1971) "Problems of measurement related to the concept of learning for mastery" ch.3 pp.29-46 in Block,J.H. (ed.) Mastery Learning: Theory and practice (New York: Holt, Rinehart & Winston)

A positive psychology course with materials provided by Jigsaw groups.

http://www.psy.gla.ac.uk/~steve/courses/posl4.html

Honeychurch,S.L. (2012) Taking Forward the Jigsaw Classroom: the Development and Implementation of a Method of Collaborative Learning for First Year Philosophy Tutorials (HEA) http://www.heacademy.ac.uk/resources/detail/subjects/prs/Discourse-11-2-6-jigsaw-classroom

Wilkinson,J. (2002) "Designing a new course" in Walker,M. (ed.) Reconstructing professionalism in university teaching: teachers and learners in action (SRHE/Open university press: Buckingham) ch.8 pp.149-169