

# PCUTL - Module 2: Pedagogic Models, Inclusive Teaching and Technology

Vincent Knight

February 12, 2013

R. L. Moore (1882-1974):

“The student is taught the best who is told the least”

This portfolio contains material relevant to my Module 2 submission of pcutl. In this portfolio I have explored at a more detailed level various aspects of my teaching and my students’ learning:

- Thanks to an analysis of feedback received from students I have evaluated my effectiveness as a teacher;
- I have carefully explored issues of inclusivity and diversity through interactions with my peers and careful exploration of the literature. I will describe in this document the potential for various technological tools available to improve my consideration of these issues;
- Through a detailed review of the literature I have evaluated in detail various pedagogic models and I will in this document describe a particular pedagogy that I feel is appropriate to myself and my students.

## **1 Analysis of feedback from previously taught module**

The feedback was given via an online questionnaire and was mainly concerned with my use and in particular the student engagement with technology in the class (I already use my own website, videos, social networks and various

other interactive tools in my teaching). The general consensus of the student feedback is positive. 70% of my students watched various videos made available to them prior to lectures and 60% of my students viewed my posts on Google Plus (a social network). I collected similar encouraging statistics with regards to the use of my own website for hosting notes, the use of an open source mathematics package and the uptake of non-contact time use of all of the above.

I also requested of the students to highlight the sections of the course that they felt were the most troublesome and the most motivating. The two subjects that the students seemed to ‘prefer’ were taught in a student led way, encouraging role play and interactivity. The subjects that however were least ‘enjoyed’ were taught in a much dryer fashion and had less pre and post contact time resources made available to the students.

I’m of course very aware that there is no causation to be inferred from this very informal causation but I nevertheless plan to concentrate (whilst considering a wide range of pedagogies) my investigation of the literature around the use of technology as well as student led activities.

It is also worth noting that in the class, there were quite a few non English first language speakers. Despite this none of the feedback seemed to indicate that these students had problems with regards to my communication. In fact some students mentioned appreciating my screencasts as they allowed the information to be viewed and re-viewed at a personal pace.

## **2 Inclusivity and diversity**

There are various aspects of inclusivity and diversity that I have carefully considered in my Module 2 lesson plan. I will not expand on them in detail here but note that they are influenced from the literature on the subject [10]:

- I have carefully considered aspects linked to physical disabilities;
- I have considered aspects linked to diversity when designing teaching resources and also when selecting groups;

A final aspect of inclusivity that I need to consider and will detail here is linked to the fact that I plan on sharing all my lecture materials prior to class. To cater for students with physical disabilities that might make reading of materials difficult I will deliver my materials in as many formats as possible.

In mathematics, the most common form of distribution of teaching materials are pdfs. This is mainly due to LaTeX (a mathematics typesetting language) and has numerous advantages:

- No need for proprietary software to view (this addresses potential inclusivity issues linked to economic status of students and/or simply preferred operating systems);
- Consistency of formatting;
- Ease of use on multiple platforms (notes can be easily viewed on mobile devices).

Potential disadvantages lie in the fact that students may prefer to change the format, color and/or size of a document. This is not possible using pdfs. An immediate solution is presented in Figure 1.

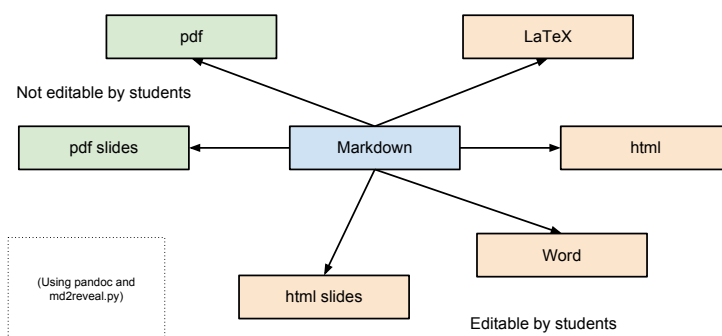


Figure 1: Universal formatting of materials.

Markdown is a very simple language that allows for the rapid creation of teaching materials. Combined with pandoc it can be used to create teaching materials in a variety of formats with little effort. Figure 2 shows various formats of a document all created from the markdown source.

I have also created a short programme that makes the creation of these universal notes more efficient. There is an accompanying youtube video available <http://www.vincent-knight.com/home/teaching/pcut1>.

From a mathematics point of view an added benefit is that mathematical formulae can also be included.

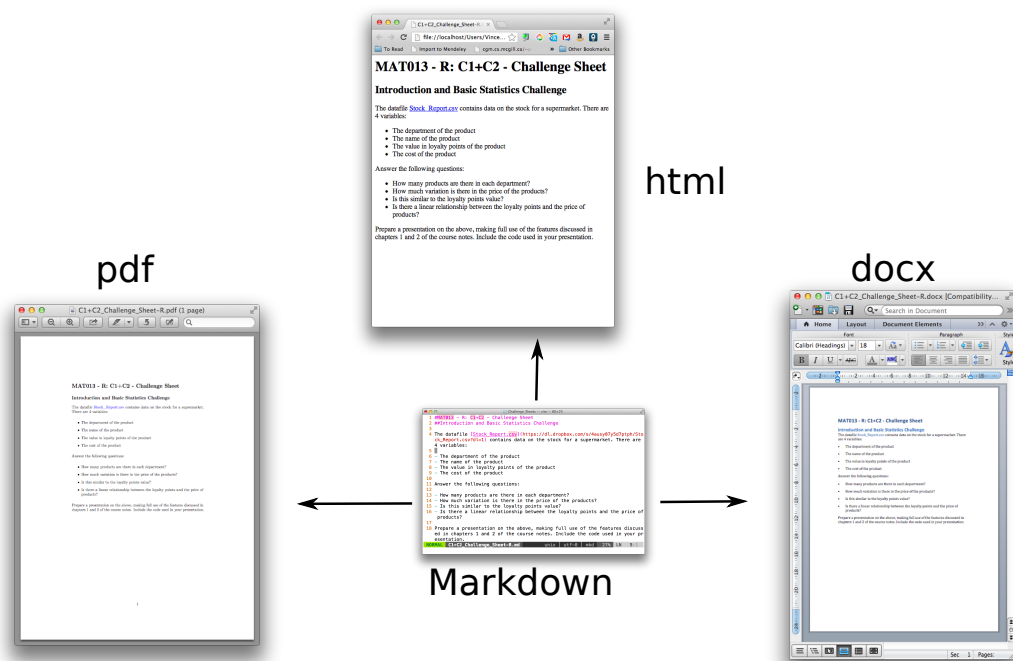


Figure 2: Creating universal notes using pandoc

### 3 Informing pedagogy

I have taken the opportunity to investigate a wide variety of pedagogies through this module. In this section I will discuss a variety of them before describing the particular pedagogy I believe I want to adopt. I obviously understand that I'm at a very early part of my career and my teaching methodologies will surely evolve. Furthermore I am not attempting to find "the best" pedagogy but more so the pedagogy that is "best for me". Having said that, in [12] a range of award winning teachers are interviewed and it seems that a general set of principles of good teaching can be identified. Here is a quote from [12]:

"The outcomes of the analysis was a set of principles of good teaching practice. Given the diversity of the sample there was a remarkably high degree of consistency to the principles. There was no evidence of any cultural disparity between East and West, indicating perhaps that academics in reputable universities constitute an international culture. The set of principles of good university teaching can, therefore, be seen as having international applicability."

As such I will now evaluate various pedagogical models in an attempt to identify a good practice of teaching.

#### 3.1 Philosophy of education

There are three basic notions of educational philosophy ([10] gives an excellent account of these):

1. Ideas
2. Experience
3. Development

**Ideas:** With concepts such as Socratic dialog [18] an emphasis is placed on logic and a questioning of conceptions. In it's essence this is well suited to Mathematics although whether or not ideas relating to the encouraging of discussion of interpretation of ideas is relevant is an interesting question. I asked the question on Google Plus and was quickly answered by a fellow educator (Theron Hitchman from the University of Northern Iowa) who often enters in to a Socratic dialog with his students when using an 'Inquiry Based Learning' (IBL) approach [12] (including discussions of Theorems), the discussion can be seen here: <http://goo.gl/LakrE>.

“IBL teaching has a Socratic feel to it, and I find my classes are full of alternate interpretations of everything. common concepts, theorems,... everything. Allowing (requiring?) the students to share and defend their ideas at every meeting has a couple of benefits.

1) you get a better window onto the variety of student misconceptions. Some are quite subtle, and some are so far away from your expectations!

2) students seem to change their minds easier when these subtle errors are pointed out and explained by peers. I think maybe it is partly a ‘let me down easy’ thing, and partly it is that the students will choose more comfortable language to get the point across.

3) If you give them time, and focus your energy on asking questions, each class will eventually come around to the commonly accepted ‘mathematician’s understanding’, and they will be much less likely to make that same mistake again. ( not that they won’t, but...)”

I found this short exchange with Theron very worthwhile. It was great to hear that Socratic dialog allowed for the discussion of *Interpretation* of mathematical facts.

As stated in [10] the philosophical notion of Idea has 3 main implications for teaching:

- an emphasis on theory before practice;
- an emphasis on logical thinking;
- a high value attached to liberal education.

Mathematics is of course very concerned with ideas and concepts and the above comment by Theron Hitchman seems to confirm that a Socratic dialogue is well suited to Mathematics. On the other side of the coin Mathematics is also very concerned with computation and applicability of ideas, this brings us to the next philosophical idea.

**Experience:** This notion is opposed to the previous in that it states that experience is more important than theory. There are two strands in this category:

- Empiricism (claiming that students are passive recipients of experience)
- Romanticism (claiming that students are active recipients of experience)

The educational implications of empiricism is that learning is a science and has general principles. Sitting well within this idea is Bloom's Taxonomy [4] which specifies different levels of learning as well as how they can be evaluated. In [22] Bloom's Taxonomy is mapped on to mathematics, highlighting particular examples and wording for questions that evaluate various levels of learning.

The implications of romanticism include that the purpose of education is the development of the whole person and that all learners are different.

The final philosophical idea builds on the notion of Experience.

**Development:** This notion compares a teacher to a gardener aiming to grow a plant 'to its full potential'.

The corresponding philosophy is 'Teleology' which is closely linked to ideas of Aristotle (plants grow, animals, grow and feel, humans, grow feel and think) [1]. Unlike the ideas of empiricism which places teachers at the center of the learning experience, this places students at the center of the learning experience.

Various implications correspond to this notion including that students must know why they are learning a topic and that they are motivated by goals.

## 3.2 Learning models

The three philosophical notions described in the previous section are worth being familiar with when looking at the three following pedagogies which aim to explain how students learn:

1. Behaviourism
2. Cognitivism
3. Constructivism

I am purposefully choosing to not discuss other more modern pedagogies (such as ‘social learning’, and/or ‘cultural learning’) as in particular the Social Constructivism of [24] seems to encompass them. I will briefly address some of the issues linked to those models in a latter section. How these pedagogies lie within the educational philosophies previously described can be seen in Figure 3.

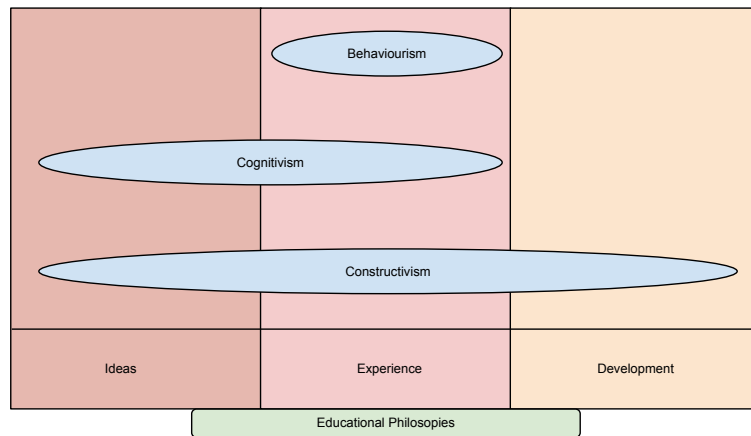


Figure 3: The philosophical basis to some pedagogies.

### 3.2.1 Behaviouralism

Behaviourism relates to classical ideas of conditioning and the early work of Pavlov [17] which for example showed how to train a dog to salivate when ringing a bell. There are various sub models within behaviourism but the class model is described in [10]:

“The classical behaviourist view has the stimulus leading directly to the response.”

In [23] teaching machines are described that could potentially put students through a series of stimuli which would let them “learn”. This notion is perhaps a reality today with the various Massive Open Online Courses (MOOCs) run for example by Coursera ([www.coursera.org](http://www.coursera.org)) and Udacity ([www.udacity.com](http://www.udacity.com)) in particular and flipped classrooms in general [3, 8, 15]. A further description of MOOCs and other modern teaching approaches can be found in [21].



Behaviourism is an efficient pedagogy in promoting rapid learning although it does not promote deep learning (with my experience of MOOCs I can relate to this). Behaviourism also has many negative connotations related to ‘power and control and has connotations of animal training’. Behaviourism is a deterministic theory: students are all the same. In general MOOCs attempt to remedy this by encouraging the use of social networks and flipped classrooms aiming to make valuable use of the gained lecture time.

### 3.2.2 Cognitivism

The way Cognitivism builds on Behaviourism is nicely explained in a single sentence in [10]:

“[...] stimulus-response does not explain how children can generate sentences they have not heard before.”

Cognitivism treats students as computers. It assumes that learning is the individual application of a mental process. Cognitivism places education in a technico-rational setting (recall the empiricism philosophy of education). As such it ignores the individualisation of learning by students.

### 3.2.3 Constructivism

Finally this leaves us with Constructivism which builds on Cognitivism by understanding not just how a student ‘perceives’ information but also how a student gives the information their own ‘meaning’.

There are various ‘schools of thought’ in constructivism:

- ‘Trivial constructivism’: teachers must not interfere with the individual process of reconfiguring perceived information.
- ‘Social constructivism’: teachers should act as a support for the learners thinking. This takes place in the **Zone of Proximal Development** [24].
- ‘Critical constructivism’: learners should construct ‘meaning’ of information by questioning ‘hierarchy’. This in essence aims to place teachers as peers.

I particularly like the ideas of Vygotsky [24] (the father of social Constructivism) . As an implication to education the idea of Scaffolding appears acting as a support which aims to help learners construct new knowledge.

A particular aspect of Social constructivism that I find attractive is that it indeed takes account of the social factor of learning. Social Learning and Cultural Learning are sometimes considered as pedagogic models in their own right yet I feel that for the purposes of teaching Mathematics it is sufficient to consider a Social Constructive model as the ideas of Mathematics are often independent of culture. Indeed, on a personal note, having experience learning in a variety of countries, cultures and as a result: social groups. My liking for Mathematics is not surprising: it was the one subject that did not change as and when I moved from country to country.

With regards to Mathematics and my own teaching, reflecting on the feedback analysed in Section 1 the above review of pedagogic models seems to strengthen my observation that student enjoyed and performed well in subjects that were taught in a student lead approach where students are encouraged to discover topics and construct a meaning on their own. This Social Constructivism approach is very similar to IBL approaches [14] and project based learning [2, 20]. The IBL approach in general is based on students working through problems alone and presenting them to the class with a high degree of flexibility allowed for students to discover further notions on their own. The quote given at the beginning of this document is by R. L. Moore the father of IBL. As such the lectures are extremely valuable as peer learning takes place, active assessment of student comprehension is always taking place and finally students are always constructing meaning themselves.

Note that some themes of this approach can be found in the interviews of award winning teachers, here are certain quotes from [12] that I found of value:

“[...] we established that the award winning teachers believed that teaching was a process of facilitating student learning”

“The real learning had taken place when I reflected on the material outside of the lectures, or I read about it or talked about it with colleagues”

### 3.2.4 What teaching pedagogy for me.

When considering Mathematics, there are various threshold concepts that can be described [5, 9, 16]. In particular the ability to not just carry out a computation but understand the computation is an important one. In [19] an account of a particular course that in a traditional sense would be noted as a success is given (for example learning outcomes where achieved). While [19] does not describe threshold concepts per say it defines 4 beliefs that are almost the opposite:

1. Formal mathematical concepts such as “proof” has very little to do with “real world problem solving”.
2. If a student is going to manage a mathematical problem they will do so in less than 5 minutes (implying that if students don’t solve a problem in 5 minutes they might as well stop).
3. Really ‘getting’ mathematics is only doable by geniuses.
4. Students do well in class by performing tasks and doing well in school (implying that ‘getting the work done’ will do).

Moving away from these beliefs is achieved using a constructivist approach in general and IBL in particular.

The issues related to an IBL approach correspond to inclusivity of this approach which might not cater well to students less comfortable with expressing themselves in front of a class. Further problems might arise with the direction of the course as students are encouraged to explore various directions of independently ensuring that intended learning outcomes are achieved could prove problematic.

I plan to address this issue by ensuring that all my class content is available to the class prior to the lectures. Indeed, the content will be prepared as if a classic lecture style course was going to be delivered. Further to this, student will also have access to videos of the lecture content: a flipped classroom. The reason behind such an approach is that a flipped classroom will ensure that the required scaffolding as prescribed in classic Vygotskian models [24] is in place to ensure a certain direction for the IBL approach.

This approach should ensure that students will gain maximal value from contact time, however if content is to be made completely available to students how can I be sure that they will even turn up?

This is a common concern about a flipped class methodology but [3] gives evidence for the fallacy of this concern:

“An often-heard comment relating to provision of material to students (usually lecture notes) in advance of class sessions is ‘If you give them the lecture notes, they might not or won’t turn up’. We gave students not just lecture notes, but in effect the entire course content in advance of class sessions: it might reasonably be asked did we not have empty lecture theatres by week 5? In fact, we did not see any evidence of a significant decline in lecture attendance 1, which we were able to ‘measure’ by observing a relatively constant number of total clicker votes per question (across 140 individual clicker question episodes) as function of a time period spanning 11 weeks of the course. There was a slight decline towards the final week of teaching in the semester, perhaps partly explained by the effects of a long teaching semester taking its toll and the looming shadow of degree examinations 2 weeks after the course concludes. This teaching methodology, therefore, provides evidence against the ‘no notes in advance’ argument as a technique to maintain student attendance and engagement.”

Further to this in [3] a detailed account is given as to the effectiveness of a flipped classroom approach as far as learning is concerned which I feel further evidences the effectiveness of this approach for Mathematics. As shown in Figure 4 the delivery of content which is often quite intense in a classic Mathematics lecture can take place independently to ensure that comprehension and construction of meaning can take place with the help of a lecturer.

A potential negative aspect to a flipped classroom is non-engagement of students, to ensure that this is not a concern, the IBL approach will encourage students to present, explain, and work on solutions to various challenges that I shall present to them. As such it is hoped that construction of meaning will also take place outside of the class and activities in the class will ensure peer learning and further scaffolding to ensure that all ILOs are met.

I feel that placing myself as a Social Constructivist with a hybrid IBL/flipped classroom approach will fully enable me to take advantage of both models whilst avoiding the potential negatives. As noted in [12] the use of technology in particular and flipped classrooms in general sit well in a Constructivist framework. Furthermore an IBL approach and the corresponding socratic dialogs surrounding student presentations sit very well in the ZPD of Vygot-

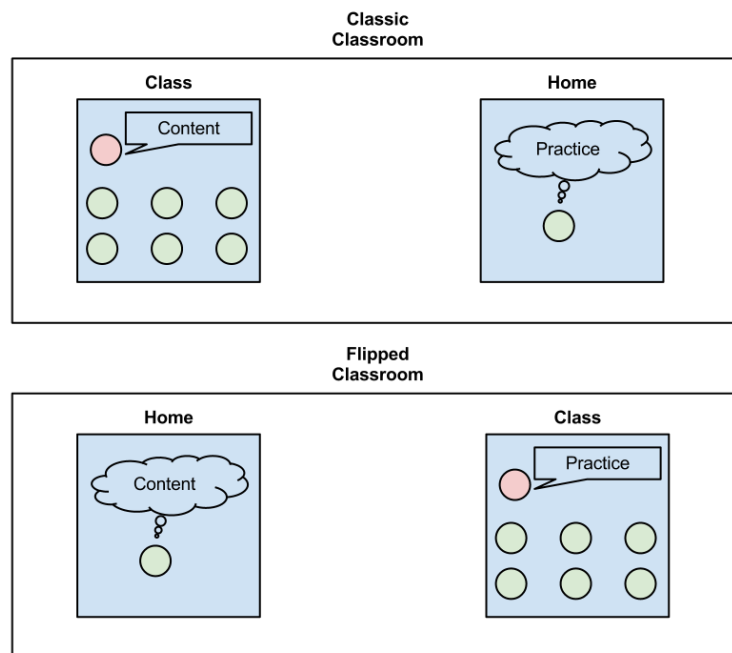


Figure 4: A diagrammatic explanation of a flipped classroom.

skyan models.

Returning again to the feedback discussed in Section 1 I feel that investing myself fully in this approach will improve the learning experience of my students.

In an upcoming course (the lesson plans of which have been peer reviewed for this portfolio), I have decided to use this approach. A talk I've prepared explaining the slightly unorthodox methodology can be found in the documentations accompanying my lesson plan.

### 3.3 Consider social and cultural learning

In Figure 3 and in my previous discussion I have purposefully ignored certain learning models concerned with the group interactions related to student learning [10]:

- Social Learning

- Cultural Learning

These two models are concerned with the placement of a learner within a group setting and the impact of the group on learning. The first states that ‘learning does not occur in isolation; it is socially constructed’ whilst the second is interested with concepts more closely linked to inclusivity saying that ‘students’ cultural perspectives influence how they construct knowledge’ [10].

Initially the IBL aspect of my proposed teaching approach should ensure that learning does not take part in isolation for my students, however due to certain cultural aspects in a multi-cultural class it might prove difficult for students to engage fully. To remedy this I plan to encourage group work as much as possible in my teaching. Groups will be constructed in a way as to ensure that students are able to fully reach their potential.

As such I will also look at using virtual communities. There are various papers that look at the use of discussion boards and/or social media in teaching [6, 7]. There are various benefits to this: in [11] it is in fact shown that engagement with twitter improved students’ marks. As highlighted in [25] there are various pitfalls, to avoid these I plan on using a Google Plus community. In [6] various social networks are analysed and an advantage seems to be allocated to Google Plus due to it’s versatility, interestingly the paper was written prior to ‘communities’ being made available. I believe that communities will allow for students to interact and peer learn. Importantly students do not need to join Google Plus to use it, this in itself (from a technological point of view) is a strength.

## 4 Building and participating in learning communities

I have participated and contributed in many ways to learning communities:

- Participated in discussions on the PCUTL discussion boards;
- Participated in various discussions on social media on the subject
- Blogged reviewing various pieces of educational literature;
- Participated in an HEA meeting looking at the teaching of programming in Mathematics programs.

## 4.1 PCUTL Discussion board

I participated in various ways with the PCUTL discussion board. Figure 5 shows a screenshot of my Module 1 lesson plan on the discussion board.

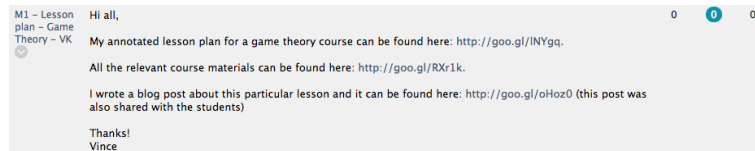


Figure 5: My Module 1 lesson plan on the PCUTL discussion board

Figure 6 shows a screenshot of my Module 2 lesson plan on the discussion board.

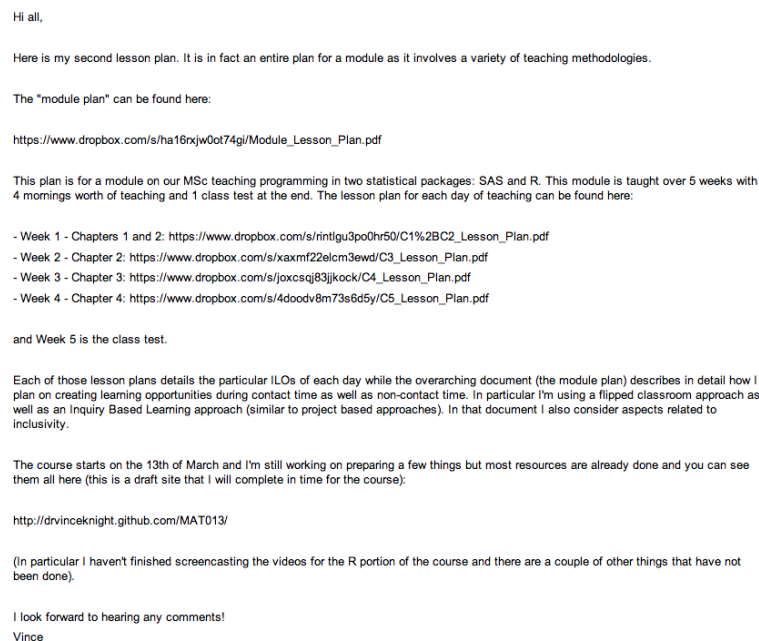


Figure 6: My Module 2 lesson plan on the PCUTL discussion board

One of my early posts on the discussion board was some links to a free book available online discussing various pedagogic models as see in Figure 7.

Free Book on Educational Psychology

Hi all,

I stumbled upon this book when looking for stuff on Behavioural Learning:

[http://peoplelearn.homestead.com/BEduc/Chapter\\_4.pdf](http://peoplelearn.homestead.com/BEduc/Chapter_4.pdf)

You can get all ten chapters by just changing the above url:

[http://peoplelearn.homestead.com/BEduc/Chapter\\_1.pdf](http://peoplelearn.homestead.com/BEduc/Chapter_1.pdf)  
[http://peoplelearn.homestead.com/BEduc/Chapter\\_2.pdf](http://peoplelearn.homestead.com/BEduc/Chapter_2.pdf)  
 ...  
[http://peoplelearn.homestead.com/BEduc/Chapter\\_10.pdf](http://peoplelearn.homestead.com/BEduc/Chapter_10.pdf)

Not too sure what it's worth but there's a lot in there...

Vince

Figure 7: Sharing a book on the PCUTL discussion board

I also entered in to various conversations with my peers including a discussion on the subject of discussion boards itself. Figure 8 shows some of the discussion.

I also gave some feedback with regards to some of my peers lesson plans as shown in Figures 9 and 10.

Due to my interests in flipped classrooms I also shared some resources on flipped classrooms on the PCUTL discussion board as shown in Figure 11.

This led to a further communication with a PCUTL peer on the discussion board as shown in Figure 12.

Whilst I found this process quite rewarding and the exchange of concerns and resources with my peers interesting I think that the technical platform used (as I discussed on the discussion board itself) is quite outdated and does not facilitate an easy transfer of communication. Before starting PCUTL I already made quite a big use of social media. In the next section I will give certain examples of some of the great interactions I have had with fellow teachers.

## 4.2 Use of Social Media

My social network of choice is Google Plus. There are various reasons for my choice of social platform but do not feel that it is worth explaining them here (I have written a blog post describing my experiences of using Google Plus as an academic: <http://goo.gl/fvSMV>).

I have found certain resources for this very portfolio on Google Plus as shown in Figure 13.



Dear all,

Is it just me, or is this discussion board software very cumbersome to use, and not at all user friendly? Is anyone else managing to print posts out within the Boards, for example, or are they – like me – having to find excruciatingly complex work-arounds? How do you edit your posts if you discover – to your horror – that they contain embarrassing mistakes?

Setting aside any moral standpoint one might have about using Facebook, I do think that their user experience is excellent, and I keep looking on this Discussion Board for the 'like' button!

I am not sure that I will be recommending this space to my students at this rate ...

Richard

I agree completely.

There are a few posts I don't seem able to comment on (some lesson plans) and as I haven't had any comments on my lesson plan I also wonder if that's because of people not being capable of commenting...

I don't use learning central with my students at all (I prefer to use my own website as I know it'll crash a lot less and is more fit for purpose as I've designed it myself) and certainly wouldn't consider using a LC discussion board with my students. I'm not on facebook anymore myself. When G+ came out I completely migrated to that (as issues relating to students seeing stuff about me that I don't want them to doesn't exist – you have total control) and have used that to chat with students last term.

There was a good paper discussing the use of social networks (facebook, twitter and G+ are discussed) with teaching:

– Here are some slides: <http://www.slideshare.net/gannodg/asee2012>  
– Here is a preprint of the paper: [https://www.google.co.uk/url?sa=t&ict=j&q=&esrc=s&source=web&cd=2&ved=0CCMQFjAB&url=http%3A%2F%2Fwww.asee.org%2Fpublic%2Fconferences%2F8%2Fpapers%2F5365%2Fdownload&ei=1r77ULDwOsa-0QWPwIDwDA&usq=AFQjCNEplj4wzPUBUu\\_4TCKsRpWZBE\\_NFA&sig2=mVlStuqVVBEnUSQ3FAcag&vrm=br.41248874\\_d.d2k](https://www.google.co.uk/url?sa=t&ict=j&q=&esrc=s&source=web&cd=2&ved=0CCMQFjAB&url=http%3A%2F%2Fwww.asee.org%2Fpublic%2Fconferences%2F8%2Fpapers%2F5365%2Fdownload&ei=1r77ULDwOsa-0QWPwIDwDA&usq=AFQjCNEplj4wzPUBUu_4TCKsRpWZBE_NFA&sig2=mVlStuqVVBEnUSQ3FAcag&vrm=br.41248874_d.d2k)

Vince

Trying to more or less reply to everyone here.

With regards to finding people who use G+ I have to admit that I have the opposite problem. I've learnt so much from G+ and struggle to keep up with the interesting people on there. If you do want to give it a try, tag me in a post (you can find me here: <http://goo.gl/ibYqK>) on there (otherwise I won't notice you, again it's a very busy place) and I can point you towards communities of people (educators, scientists, you name it there are literally too many people to circle on there). I wrote a blog post about using it a while back (if it's of interest): <http://goo.gl/fvSMV>

I literally have to filter people I circle as I just can't keep up...

With regards to putting all your eggs in to one basket, that's not a bad argument at all but obviously it is the case for any commercial product for which we're not the customer but the product (facebook, google, any other free site etc...): the plug can just be pulled... (I actually use google sites for my own website and plan on migrating to my own server soon, migration shouldn't be too big a problem as you can just pull down the html but perhaps this was different with their previous incarnation...)

With regards to how I communicated with students on there, it was a mixture of public and private posts (that's one of the great things about G+, it's all very easy to control, I've been told that's easier on fb now but again I don't use it so wouldn't know). I'm a huge open-science and open-education advocate/fan so try and post most of my education and research stuff publicly and so have had some conversations with students in public (for example something as simple as students pointing out typos in my notes) but have also had a more private discussions (when the students wanted it) on there as well. G+ have recently brought out a community feature which I plan to use on an upcoming course, not sure how that will work :) I put up my previous portfolio on my website and will put up module 2's one as well in which I'll probably talk about all this in more detail in case anyone's interested (I'm not saying it's worth much and I'm sure that the various solutions depend on each of our own personalities...)

I forget if that was everything that people had discussed (again this discussion board is pretty terrible)

Just remembered someone saying something about Cardiff should provide something like this. I guess the answer is that they do (this discussion board) but like with so much else there's a lot better out there (I pretty much use nothing that is provided by insrv, there are better solutions on all dimensions for my needs in my humble opinion).

Cheers,  
Vince

Figure 8: Discussing discussion boards on the PCUTL discussion board

▼ Parent Post

Fascinating lesson Richard!

I think you've given a very impressive set of comments with regards to inclusivity. My main reflection throughout was indeed what happens if/when a student got distressed due to the nature of the images.

Due to the nature of the course it brings with itself a question as to whether or not any modification are "reasonable". I think you address this given that you explain to students:

"The students are advised that, should they become distressed, the session will be suspended, so that the appropriate steps can be taken."

One potential worry that remains (but again I'm unsure whether or not there is a "reasonable adjustment" that could be made) is whether or not certain religious or cultural barriers would stop a student from want to to touch the materials. Is this something that you have considered?

▼ Parent Post

Dear Vincent,

Thankyou for your valuable comments.

I have given some thought to how I prepare the students for the emotional impact of the material that they will see whilst doing their Student Selected Component (SSC) in forensic pathology in our department.

During their induction session with me, I discuss the range of emotions and physical feelings that might be experienced during their SSC, mainly when observing autopsies, but also when looking at photographs. I ask them about their experience thus far about observing dead bodies, and they have all been learning anatomy via dissection of cadavers, so have some relevant experience. They do not usually have any previous experience of seeing traumatic injury in A&E, for example, and this is a potential problem of having the SSC with us in the very early stages of the medical curriculum.

I have become more 'up front' about the possibility of being distressed by the subject matter, and am also spending some time with the students at the end of the SSC to explore how they felt during their time in our department. I have already had some very useful discussions with them about this, and have found that a common feeling is that seeing a recently dead body is a 'surreal' experience, which can initially make students feel very uncomfortable. I discuss with them how one copes with such experiences in medicine, and in forensic pathology, and I have found that some of the students have developed their thoughts about this aspect of medicine in their reflective diaries that I ask them to complete following their SSC.

With regard to the cultural aspects of touching the weapons/ implements, I had not thought about their use/ usefulness in this context. However, there does seem to be a general reluctance on the part of some students (not from any specific cultural background, ethnicity, or sex) to pick the weapons up. After some encouragement, and some specific questions which prompt the student to pick up a particular weapon (an axe, for example), this reluctance seems to be overcome, but I am keeping the use of the weapons under observation, to see whether they can be used in alternative ways, whilst still retaining the usefulness of their physical presence/ availability.

Is there a way, do you think, that I could utilise these weapons differently?

Thanks again Vincent!

Many regards,  
Richard

▼ Parent Post

Hi Richard,

Apologies for the late reply.

As I had said in my original query I'm not sure if my comment/concern was in fact reasonable. Having said that thanks for your reply, it certainly seems like you have considered most of the aspects I could think of.

I'm afraid that I can't think of any better uses myself.

Good luck with the rest of the portfolio  
Vince

Figure 9: Discussing inclusivity in a forensic medicine lesson plan

Hi Jeremy,

Your lesson plan description certainly caught my eye. Congratulations for finding an excellent topic with regards to PCUTL, I realise that's obviously not the motivation but I thought it was great how this lesson plan addressed issues of inclusivity as well as TEE (as well as technology itself with something as "new" as Graph Search, wasn't it just announced a couple of weeks ago? Cool).

With regards to the actual lesson plan, my first comment would be with regards to inclusivity. Not as much with the content and/or delivery but with the lesson plan itself. The automatic translator has got a few bugs in it (more or less minor although once or twice I wasn't sure what was going on and had to ask my fiancée to translate the original). I understand that this is the lesson plan itself and not actually targeted towards the students but it got me wondering about other resources for your class that you might do the same with. I realise of course that this might not be a reasonable concern: this is a Welsh course. Students are expected to speak/read Welsh, so perhaps ignore this comment, maybe it's just me thinking out loud...

My other main concern would be with regards to the subject area (homosexuality in Tehran). Scenarios like those we discussed during the PCUTL workshop might well occur. I'm not on facebook so I apologise if I'm being ignorant but if your students searched for "men who are romantically interested in men" would a bunch of profiles appear of people who are essentially acting "illegally" in their own country? I would be a bit worried if I had a student in my class who was perhaps homophobic and would somehow use that information. I'm perhaps being a bit over cautious here but I wonder if this is something you have considered?

Fair play to you to be willing to risk these issues though as I feel that this class is extremely well designed. I agree with all your concluding points and appreciate your constructivist methodology. The use of technology is also ever present and strengthens the students overall skills. I suppose in future years, if other students had indeed videoed their presentations you could use them as resources for the current students...

Best wishes and good luck with the rest of PCUTL,  
Vince

Figure 10: Discussing certain issues of inclusivity in a Welsh lesson plan

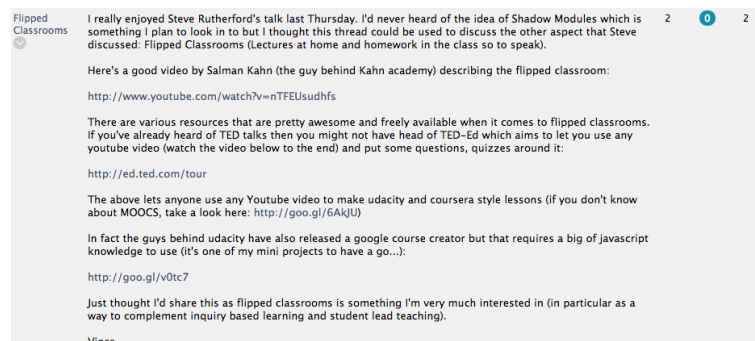


Figure 11: Sharing flipped classroom resources on the PCUTL discussion board

Hi Vince,

I was wondering whether you'd had any luck with the Flip Classes? I'm going to try one next week and was looking for feedback. Is it a good way of conveying informational material thereby freeing time up in the classroom? How do the students react to it? Do you/they view it as more preparation time and therefore more stressful in terms of what there is to do/prepare in class? A few questions there, but with the emphasis now being on creative and analytic skills (rightly) rather than more information transfer, I think this is an avenue I'd wish to explore, especially as the emphasis of my course is on technological skills.

Another question - as you seem to be technically minded. As I've just mentioned on another post, I find this whole blackboard system cumbersome. In terms of the most superficial aspects such as the Welsh language skin to it - it's awful: the translation is inconsistent with itself, and the terminology is different from that used, for example, in Microsoft office, so users get an inconsistent experience. 'Cancel' is translated as 'delete'. Which is unfortunate. But my question is more technical - have you ever used a virtual classroom in Blackboard? I'm thinking of using it for office hours for my language technology courses. Do you know anyone who has done this? Would you be interested in a co-experiment? We talked as a class on PCUTL about Communities of Learners. It would appear that a similar feature would help out of class contact hours. For example, I organise my lecture group into smaller seminar groups, give them a task to prepare for a seminar for a few weeks hence and expect them to get on with it. But they could live anywhere outside Cardiff. I can't see any facility in Blackboard that would enable this - do you know of any? I'm eager to keep them within the University environment if at all possible, but the Blackboard functionality doesn't seem to cut the mustard. (Or maybe we should all be trained more detailedly in it?). Do you know any student groups that use Google Hangouts or something similar?

That's it for now - quite a few questions there, but I think the answers may benefit us a lot.

Jeremy.

Hi Jeremy,

I've taught two courses using a flipped classroom. The first was a bit of a hybrid and I shared certain concepts with students before class (still using classic lectures otherwise). I subsequently asked for feedback and from memory I think 80% of students found it helpful (in fact most students commented that they found the videos helpful). My other class was a programming class (SAS; a statistics package) and it worked very well (I believe). I have a series of short videos (>3 hours) explaining all the concepts and I start every lecture by asking if there was anything unclear and we just kind of go from there (sometimes the lectures were very short leaving more time for the lab). This worked well. The students did not seem to mind and I think enjoyed it. There's actually some evidence for students preferring this methodology. I'm not sure if it will be of interest but I'm in the middle of a blog series I started with pcutl, reviewing education papers (with an emphasis on math): here's a post I wrote last week looking at flipped classrooms: <http://goo.gl/pG8Ag> (there's a link to the actual paper on there as well).

With regards to discussion boards, I have to admit I hate learning central as a general rule (as I wrote on a response to someone elses post complaining about the discussion board, for my needs there's consistently a better solution for me and my students) so I'm going to be a bit negative towards LC here...

> have you ever used a virtual classroom in Blackboard?

The quick answer: no.

> Do you know anyone who has done this? Would you be interested in a co-experiment?

I don't know anyone who has used blackboard for this and I'm afraid that yet again I feel that there is better out there (again "better" here perhaps just means better suited to me and my personality as a teacher) and every time I use university stuff it just ends up being a nightmare and causing me far too much work so I won't be rushing to try...

HAVING said that, there's a nice paper that I blogged about recently (this was my latest one so has a link to the 4 others, planning on writing another one today): <http://goo.gl/z8uHk> that looks at using social networks in class. They discuss twitter, facebook and G+. For the paper they actually use G+ and they do use hangouts for virtual office hours.

For my upcoming class I've set up a Community on G+/<http://goo.gl/PPtV8>. They're very flexible and I've set this one up so that anyone can see the content but people need to be ok'd by me to be able to contribute (I've got reasons for this particular set up that I'm happy to share but it basically makes it very easy for students to view with/without a G+ account and it's secure from outside spammers so to speak). It's the first time I've used this (as I say in my blog post, communities are brand new) so I'm looking forward to seeing how it works...

I hope that helps with some of your questions... I've got a few more references on flipped classrooms that might be of interest. In fact here's the Mendeley page with all the references that are in my portfolio so far (I believe you should be able to view that but you might need to sign in to Mendeley which if you don't use I recommend):

<http://goo.gl/DKX0k>

> Would you be interested in a co-experiment?

I'd love to find some common ground to work together on :) Very happy to chat about this further...

Vince

Figure 12: Chatting with Jeremy Ewas on the PCUTL discussion board

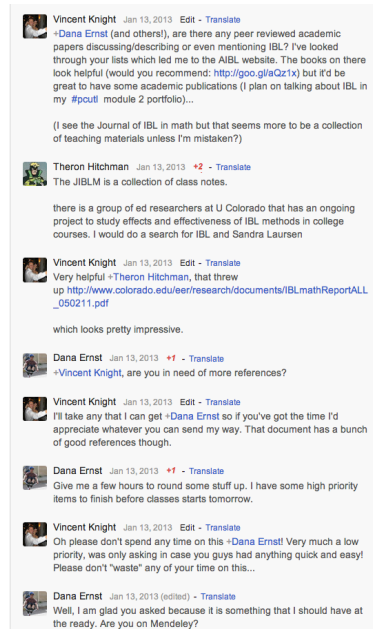


Figure 13: Finding educational resources on Google Plus

I've had discussions discussing teaching approaches as shown in Figure 14.

I've also had some very useful pointers and discussions of my own teaching resources as shown in Figure 15.

I've shared 'circles' of educators as shown in Figure 16.

Finally, as discussed previously, I have used and continue to use Google Plus with my students encouraging them to not online interact amongst each other but also to engage with various teachers and practitioners in the field of Mathematics in general and Operational Research in particular.

### 4.3 Educational Literature Review

As well as using Social media I also have a blog that I use to post about my teaching and research (for example here is the blog post related to the class I taught for my peer reviewing module 1: <http://goo.gl/oHoz0>).

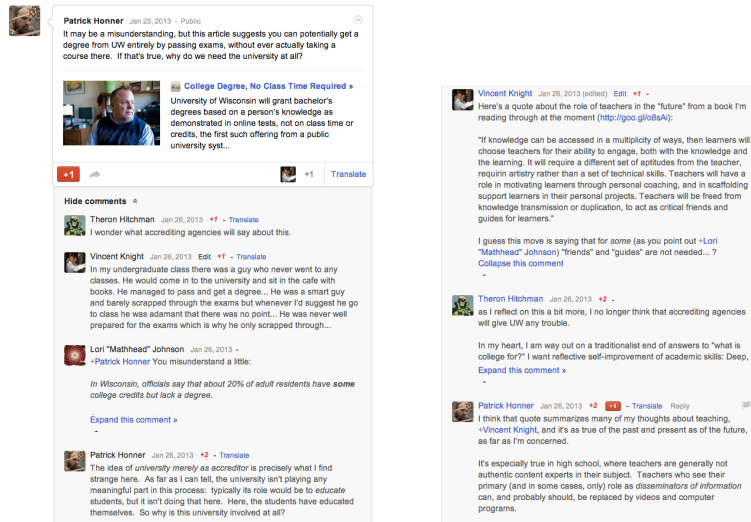


Figure 14: Discussing good teaching

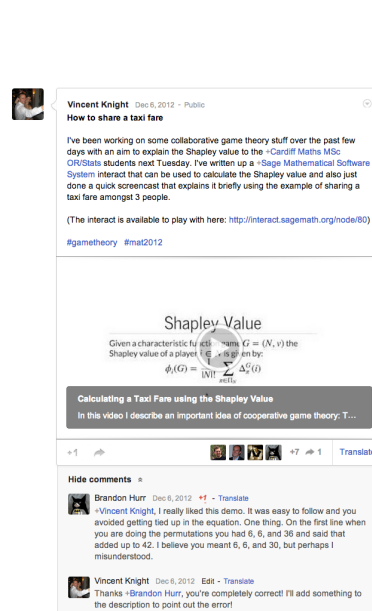


Figure 15: Sharing a video on the Shapley value



Figure 16: Sharing a community of educators

For this module of PCUTL as I made it a point to read a lot of education literature I decided to blog short reviews of as many pieces of literature as I found time to do. A list of these posts with links to each one is available at [www.vincent-knight.com/teaching/pcutl](http://www.vincent-knight.com/teaching/pcutl).

The blogs posts were quite well received:

- Currently more than 700 views
- Most viewed post was my first one (currently 136 views and one short interesting conversation) which reviewed [19].
- Least viewed post (currently only 48 views) which reviewed [22].

I received some warm comments on social media. Here is a quote from a teaching in the USA who I was thanking for sharing one of my posts on Twitter to his 2049 followers.

“My pleasure—I’m enjoying recent focus on math ed issues. I think a lot about learning and teaching, but I wouldn’t say I’m extremely well-read on the topics. It’s nice to following along with what you’re reading, as well as have another voice in the conversation!”

## 4.4 HEA Meeting on programming

In the next academic year I will be teaching a new first year module aiming to teach computer programming for Mathematics. With this in mind on the 4th of February 2013 I went to a one day HEA workshop entitled: ‘HEA STEM (Maths, Stats and OR): Experiences of learning programming within a Mathematics course’.

There were 20 delegates present from universities all of the UK. It was a great networking opportunity and I was able to learn quite a few things from the experiences of other teachers which I will take forward in the preparation on of a module I’m teaching next academic year.

## 5 Further development

There are various dimensions in which I can expand my professional development as a teacher:

- Further understanding of pedagogic models;
- Further understanding of methodologies;
- Further building and participating in learning communities.

On a very tangible note however, an immediate issue that I aim to evaluate is the marking of group projects. There is a growing body of literature aiming to inform best practice when it comes to recognizing individual performance in group work [13].

As I plan to use a lot of group work in my teaching I feel that this is something I need to look at closely. An initial investigation of the literature [13, 12] shows that most approaches make use of feedback from students to evaluate the individual contribution of all group members. I do not see any alternative to this approach but do believe that a more sophisticated and fair approach could be used to map perceived contributions to marks.

Following discussions with my mentor Professor Paul Harper, the approach we propose would place group work within a cooperative game theoretic framework and would use the Shapley value to fairly recognise individual contributions. The Shapley value can be calculated using the following

equation (I realise that this is given in this document without sufficient explanation):

$$\phi_i(G) = \frac{1}{|N|!} \sum_{\pi \in \Pi_N} \Delta_{\pi}^G(i) \quad (1)$$

There are issues of transparency that must be overcome when using such an approach but in a Mathematics department these should not be insurmountable. The idea revolves around the potential contributions of all subgroups within a group. Consider the following feedback obtained from a group of three students ascertaining what potential of the total mark would have been obtained by each subgroup of the group:

$S$	$v(S)$
$A$	40
$B$	40
$C$	20
$\{A, B\}$	70
$\{A, C\}$	60
$\{B, C\}$	40
$\{A, B, C\}$	100

Using equation (1) the Shapley value can be calculated for each member of the group:

Student	$\Phi$
$A$	45
$B$	35
$C$	20

If we assume that the marking criteria states that group work would be marked with 70% of the mark being dependant on output and 30% being dependent on group work a fair mark could be given using the following formula:

$$m(i) = M \times \left( .7 + .3 \times \frac{\Phi(i)}{\max_j \Phi(j)} \right) \quad (2)$$

Where  $M$  is the total mark given to the project. In our above example, if we assume that the project was worth 85 the marks given to each individual would be:



Student	Mark
$A$	85
$B$	78
$C$	71

As discussed this approach still needs to be carefully considered. One of the immediate disadvantages of this approach is its transparency. Various resources would need to be put in place to ensure that students *understood* the approach. As described previously I feel that in a Mathematics department this is not unsurmountable. Furthermore, there are various advantages to this approach. First of all, it is theoretically sound and is in fact the only ‘fair’ approach of distributing marks. Various other aspects are advantages to this approach such as the fact that the only way for students to maximise their marks is for them all to contribute equally.

Further investigation of this approach is an exciting prospect as I feel it would be of publishable quality in a reputable education journal.

## References

- [1] Aristotle. *Politics: A Treatise on Government*. null.
- [2] John F. Barell. *Problem-Based Learning: An Inquiry Approach*. Corwin Press, 2007.
- [3] Prof Simon Bates and Ross Galloway. The inverted classroom in a large enrolment introductory physics course : a case study .
- [4] Benjamen S. Bloom. *Taxonomy of Educational Objectives: The Classification of Educational Goals*. Longman Group United Kingdom, 1969.
- [5] Glynis Cousin and Higher Education Academy. Section 1 : Introduction to threshold concepts An introduction to threshold concepts. (17), 2006.
- [6] Gerald C Gannod and Kristen M Bachman. A Characterization of Social Networks for Effective Communication and Collaboration in Computing Education. In *119th ASEE Annual Conference and Exposition*, 2012.
- [7] Louise Horstmanshof and Sonya Brownie. A scaffolded approach to Discussion Board use for formative assessment of academic writing skills. (January 2013):37–41, 2011.
- [8] Jeremy F. Strayer. *The effects of the classroom flip on the learning environment: a comparison of learning activity in a traditional classroom and a flip classroom that used an intelligent tutoring system*. PhD thesis, 2007.
- [9] K Jooganah. Proof as a threshold concept for university mathematics : an exploration of student identity and transition. 2007.
- [10] Anne Jordan, Orison Carlile, and Annetta Stack. *Approaches to Learning: A Guide for Educators*. Open University Press, 2008.
- [11] R. Junco, G. Heiberger, and E. Loken. The effect of Twitter on college student engagement and grades. *Journal of Computer Assisted Learning*, 27(2):119–132, April 2011.
- [12] David Kember and Carmel McNaught. *Enhancing University Teaching: Lessons from Research into Award-Winning Teachers*. Routledge, 2007.
- [13] Mark Lejk, Michael Wyvill, and Stephen Farrow. A Survey of Methods of Deriving Individual Grades from Group Assessments. *Assessment & Evaluation in Higher Education*, 21(3):267–280, September 1996.

- [14] W. Ted Mahavier, E. Lee May, and G. Edgar Parker. A Quick-Start Guide to the Moore Method, 2006.
- [15] Shawn Mccombs. The Efficacy of Podcasting Technology in Instructional Delivery. 3:123–134, 2007.
- [16] Jan Meyer and Ray Land. Threshold Concepts and Troublesome Knowledge : Practising within the Disciplines. Technical report, 2003.
- [17] I.P. Pavlov. *Conditioned Reflexes: An Investigation of the Physiological Activity of the Cerebral Cortex*. Dover Publications Inc., 2003.
- [18] Plato. *The Republic*. null.
- [19] Alan H Schoenfeld. When Good Teaching Lead to Bad Results: The Disasters of "Well Taught" Mathematics Courses. *Educational Psychologist*, 23(2), 1988.
- [20] Peter Schwartz. *Problem-based Learning: Case Studies, Experience and Practice (Case Studies of Teaching in Higher Education)*. Routledge, 2001.
- [21] Mike Sharples, Patrick Mcandrew, Martin Weller, Rebecca Ferguson, Elizabeth Fitzgerald, Tony Hirst, Yishay Mor, and Mark Gaved. Innovating Pedagogy 2012. Technical report, 2012.
- [22] Lindsey Shorser. Bloom’s Taxonomy Interpreted for Mathematics. Technical report, 1999.
- [23] B. F. (Burrhus Frederic) Skinner. *Teaching machines*. Freeman, 1961.
- [24] Ls Vygotsky. *Mind in Society: Development of Higher Psychological Processes*. Harvard University Press, 1978.
- [25] Susan C Wilkinson. Using socially constructed technology to enhance learning in higher education. *Journal of Learning Development in Higher Education*, (3), 2011.