

My Journey Towards Student Excellence

Delivering outstanding student success and eliminating the BMEI grade deficit through the use of research based learning and with students as co-producers and partners in research and publications in a transnational educational environment.

1 Summary

This is my journey as an academic which demonstrates my passion to enable everyone that I meet and interact with to excel in all that they do. It started when I was working at Rolls-Royce plc and realised that I gained great satisfaction, as a middle manager, in mentoring my staff and helping them to becoming successful. The journey then develops with the first light-bulb moment when I realised that, as an academic, my key role was to use any specific module or course as a vehicle for developing the critical thinking skills of the students in my classes.

This understanding enabled me to lead several modules on an MSc which the University of Derby taught in Malawi and Botswana to mid-career middle and senior managers, where the concept of teaching questions rather than answers in the students' own context was developed and resulted in stronger engagement with the course materials (derived from Problem based Learning). The second light-bulb moment occurred about three years ago, when I finally realised that I did not even have to teach (the academic as "domain expert" concept), rather it was far more fruitful to guide my students to learn the domain concepts via the academic as "learning-to-learn expert" approach.

This was a transformative moment in understanding the freedom that I have to use scheduled contact time for purposes that enthuse and lead the students to develop all the critical soft skills, alongside necessary technical skills and domain understanding, which are vital for success as students and also for employability. I was strongly supported and encouraged in developing my approach by my senior management. I would not have dared to take this journey without their support because of the risks of potential failure.

A consequence of my new understanding was to set very broad topic areas for the assessments with the students being required to research and then negotiate the precise focus of their assignment, with the use of formalised formative reviews of the final drafts of their work against the rubrics, followed by a revision period leading up to the summative assessment. This guided and mentored negotiated topic approach also ensured that students engaged more effectively because they choose a topic close to their own specific interests.

Many of my assessments are based on producing reports, which are normally presented in one of the domain academic journal article templates to help develop the students' presentational skills for employability. The best of these articles are then edited by volunteers and e-published. These e-publications then become resources for following years' students, thus directly implementing Prof M Neary's "students' as co-producers" approach.

In addition, this understanding also freed me from the pressures of domain research. Instead, my students do much of my research for me, which I then consolidate and publish on their behalf. A significant consequence has been that we (the University of Derby) have become a leading centre of expertise in the field of smart phone Location Services accuracy and in me being invited to international Industrial conferences on the subject. I am also invited to give

tutorials and workshops at international conferences in both my academic domain of Analytics and Governance and also in my pedagogy of Learning-to-Learn expertise leading to excellence in achievement.

Application of Learning Analytics (which developed from the ISOTL validation of research into pedagogy and the impact of changing pedagogies) to my cohorts shows that I now deliver some of the best results across the University and in many instances there is no significant BMEI grade deficit. Based on final year module reports from 2013/2014 academic year the evidence shows

- Very high average marks for my modules and 1st/2:1 levels
 - 72% - 78% average, 75% to 82% 1st/2:1
- low to zero BMEI grade deficit
 - final year modules in 2013 grade difference of 0% to 2%

Comparison of the data from my older Domain Expert teaching days suggests that the new approach has lifted the mean grade from 56% (in 2004) to 71% (in 2014).

The following figure demonstrates the step change in achievement with the full use of the new approach in the 2012 and 2013 results and also the evidence that my approach has led to very small differences between the UK White and BMEI students, which has been, and still is, a significant issue in many HE institutions (University of Northampton, 2009, Stevenson, 2010, Alltree et al, 2010, Berry and Loke, 2011, HEA, 2011 and Senior, 2013).

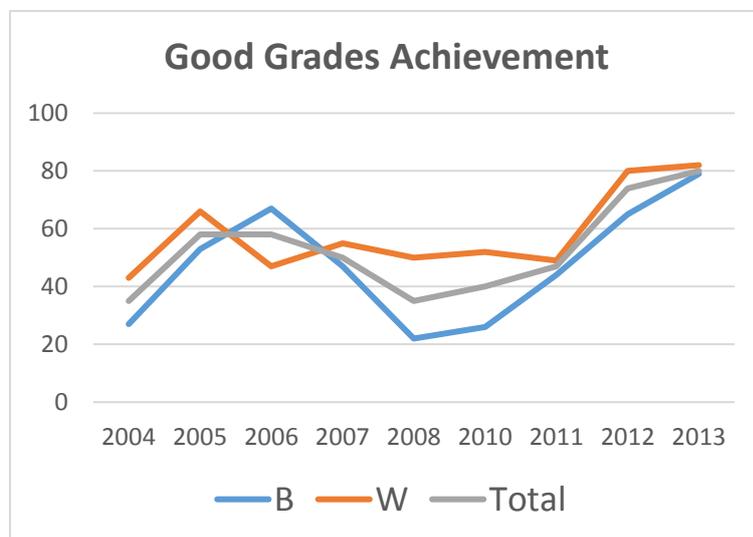


Figure 1 Good Grades (1st and 2:1) from 2004 to 2013

2 Individual Excellence

2.1. Introduction and context

My approach is focussed on helping each student to develop their own personality, uniqueness and individual excellence and to use this to provide the connection between the domain material and their learning. I have become more confident in this approach and had

this confidence reinforced by using learning analytics to confirm my pedagogic choices. I have been able to transform the whole learning experience of my students. This leads to the individual excellence on my students.

The foundation of all that I do is based on the perspective that ‘I do not teach; rather, I facilitate, catalyse and guide learning. I pose questions rather than present answers’ contrasting with ‘if I give you answers then you stop learning’.

To modify Plutarch’s words, my approach is based on a view that

“Successful education is about lighting fires of enthusiasm to inquire, research and learn continuously, rather than filling leaky buckets of memory”.

My experience with this approach shows that getting students to fill their own buckets mysteriously and magically repairs all the leaks as they learn by exploration and research and application: in many ways a practical validation of constructionist pedagogy.

In this learning model, seminars provide the students with the opportunity to research and explore, within a relevant, defined context, academic and industry sources which identify, explain and justify relevant theories and analytical frameworks. The workshop that follows then provides the students with the opportunity to apply their new-found knowledge of theories and frameworks to their developing assignment, with regular, weekly opportunities to obtain appropriate, individual feed-back and feed-forward in relation to the developing drafts.

“He reviews and gives us feedback on our assignments allowing us to improve not only our assignments but also our understanding of the topic at hand.” (M, Final Year Student)

The second aspect of the teaching philosophy, which is reflected in the design of the curriculum and activities, is that continual prompt and instant feed-back and feed-forward during the seminars and workshops is vital and generates very positive results, including high attainment levels, very low failure rates and can also reverse the BME&I to White UK attainment level ratios.

2.2 Pedagogic Approach

2.2.1 Learning Analytics to Confirm Academic Choice

The ISOTL has validated the appropriateness of scientific, quantitative and qualitative research into the nature of and achievements of different forms of pedagogy. It is, therefore, appropriate to provide a few graphs that illustrate the achievements of my approach and which have provided me with the confidence that I have made significant improvements in helping my students to raise their game and, ultimately, their employability.

Figure 2 illustrates the improvement in the distribution of grades that resulted from the change from the Domain expert approach to the Learning-to-Learn expert (Skills) approach (see orange lines).

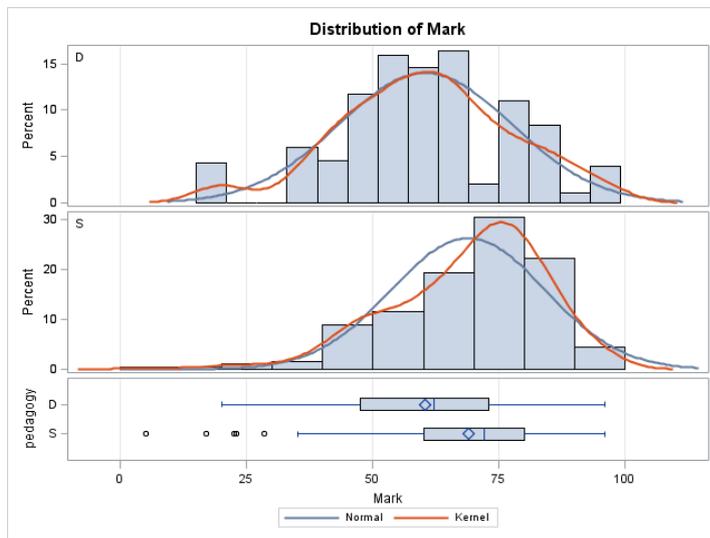


Figure 2 - Change in Mark Distribution Profiles from Domain Expert to Learning to Learn Expert

Figure 3 illustrates the very large change in grade profiles from my early teaching (2003/2004) using the Domain approach to the grade profiles in 2013/2014 when I was using the Learning to Learn Skills approach (see orange lines).

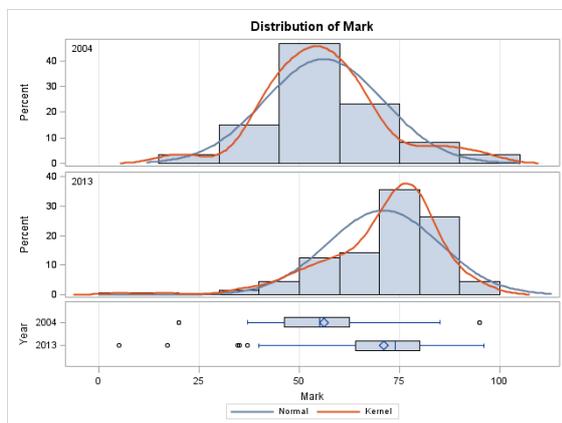


Figure 3 Mean Achievement 2004 compared to 2013

Figure 4 illustrates the fact that by 2013, the BMEI mark deficit has all but disappeared (see orange lines).

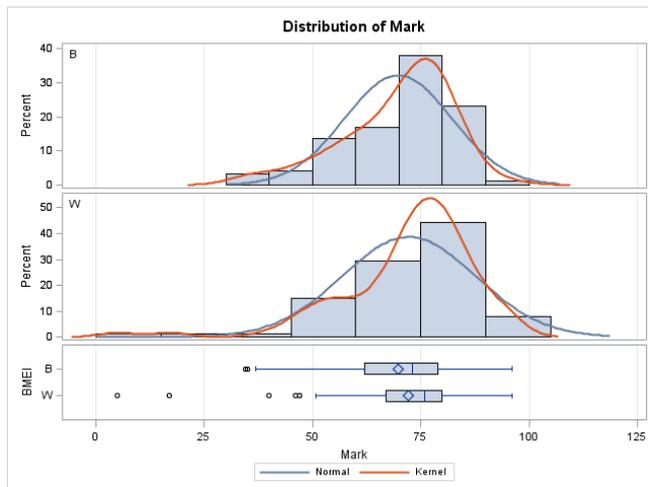


Figure 4- BMEI versus White UK profiles for 2013

The results of learning analytics provides confidence for me to continue developing this approach, to colleagues and external examiners that the process is valid and can be used to evaluate their own pedagogic developments and to also re-assure students that this very different learning and assessment model will benefit them and allow them to excel.

2.2.2 Academic as “Learning to Learn” expert

This approach is in direct contrast to the perspective of the academic as “Domain Expert” who feels the need to cram all the relevant domain knowledge and answers into the minds of the students, using very densely worded presentation slides full of the specific facts and theories, using intensive lecturing styles and highly prescriptive tutorial exercises.

The “Learning to Learn” academic understands the broad perspectives of the subject, the key challenges in the domain and ways to guide students in developing their learning skills through the use of questions that prompt further consideration of the topic, rather than answers which tend to stop the learning process.

The approach uses a seminar based approach allied to very open workshop activities, which are structured to enable the students to connect the learning materials to their passions and interests in the subject area.

“The broadness of the question allows students to make the assignment their own”,
(G, final year student)

The approach is based on providing questions for the students to research in specified broad current contexts which can be immediately applied to their assessments.

2.2.3 Leading “Horses to Water” or Research Based Learning

It has long been recognised that students cannot be forced to learn and that lectures are not a particularly successful form of delivering knowledge and skills to students. It was in recognition of this that the “Flipped” model (Educause, 2012) was developed in which, students were asked to do some work before lectures or seminars. However, my own experience has been that even with the best resources available, most students are extremely resistant to doing any pre-seminar work.

In recognition of this reluctance of students to fully engage with the standard flipped model, I now use an extreme version of the flipped model, where there is no pre-work required, although it is still encouraged, but does not use the video presentation aspect for self-study prior to seminars and workshops. Seminar videos are posted on YouTube for review and revision afterwards.

“He videotapes all of the sessions allowing for reviewing, some days you might not be able to take the notes you want. Re-watching the videos can give you some smart insights later on as you understand more of the topic.” (M, Final year student)

“This is great for understanding key areas of his modules and using them as a reference during the assignment writing process. It also helps with fully focussing on listening to his lectures first time round, without the need of frantically writing notes in the fear of missing anything important.” (G, Final year student)

This approach leads to intense engagement in the subject during the supervised learning periods of seminars or workshops or tutorials. It draws on the ideas of experiential learning and the “learn by exploring” (Kolb 1984) variant of “learn by doing” which explicitly employs elements of problem-based learning (Hmelo-Silver 2004) and enquiry-based learning (Edelson et al. 1999). It also leads to very high student achievement and satisfaction.

I deliver each seminar as a short context for the topic and then suggest two or three significant questions that they need to research and find multiple sources and perspectives which will be used in small and plenary group discussions.

“A great aspect is the very in-depth research on topic” (second year student)

The impact of this approach is that the students are researching what would otherwise be (boringly) presented by the lecturer.

“Good to have interesting and engaging discussion with lecturer” (second year student)

They are finding the latest sources, thus partly fulfilling the co-producer approach to pedagogy. It also reflects the modern need for continuous learning in a world of ever increasing rates of change and development of STEM subjects. We need to prepare our students to continuously find the latest knowledge and information that is relevant in any specific context.

2.2.4 Lighting Fires of Enthusiasm

My assessments are always set in a very broad context that meets the module learning outcomes. However, each student is required to research and find a suitable topic which relates to their own interests and passions.

“Your approach to teaching is nothing short of refreshing; not only is it inspiring but also encourages creativity and novel thinking” (L, final year student)

Students, who are new to the approach, sometimes find this freedom rather challenging.

“Whilst some students may find a broad assignment title rather difficult, Richard has given us the confidence to interpret the assignment however we see it, with the mantra that no answer is wrong if there is evidence to back it” (G, Final year student)

However, once I have helped them understand the freedoms that they have to connect their assessment context to their own interests, it is fascinating to watch the sudden and dramatic change in their enthusiasm for both the assignment and then the module and my overall approach to helping them learn and deliver such good results.

“The way that the assignment was done allowed for a lot of creativity” (Second year student)

2.2.5 Formative and Summative Assessment Approach

Because the primary focus of the pedagogy is towards “learning to learn”, mentoring and coaching in employability skills, the decision was taken to dedicate all contact time in two or three weeks to individual formative and summative review and assessment of each student’s final draft and final submission based on a pre-published 15 minute review schedule using the rubric and a discussion of the work, with a view to improving the strength and quality of the report. All relevant comments are recorded electronically and provide the basis for the improvement of the final draft, prior to final submission.

“He is one of the best teachers to have taught me in University of Derby, and this is clearly reflected by my grades, as the grades I received in his modules are much higher than the rest (because) he reviews and gives us feedback on our assignments allowing us to improve ... our assignments ” (M, final year student)

Learning Analytics shows that the formative review improves students’ achievement by between 10% and 25% on average from the “Final Draft” formative scores to the “Final Submission”, see Figure 5 .

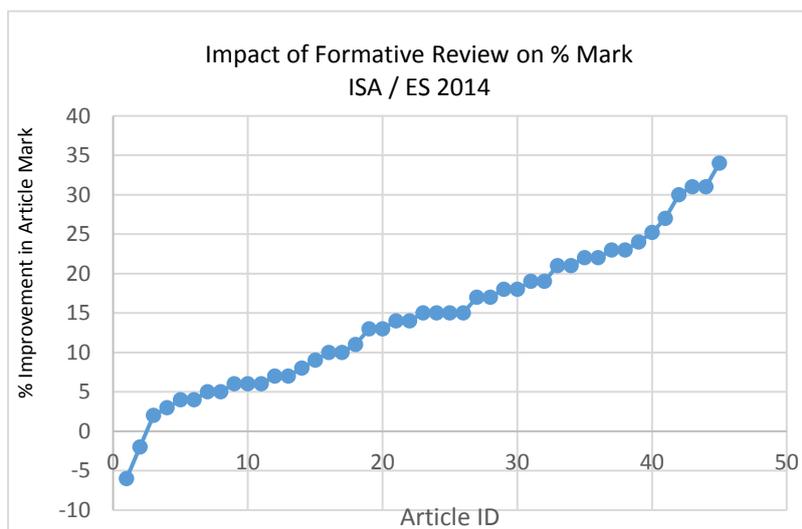


Figure 5 Impact of Formative Review

2.3 Examples of developing Excellence

2.3.1 Questions not Answers – Leads to Inquisitive Students

Humans learn more from their own mistakes than from other peoples' mistakes. We also learn better if we figure out the answer for ourselves than being given an answer. As a result, it is far better to answer a student's question with another question which can help them towards developing a suitable answer for themselves. This is part of the process of the mentoring and guiding process that students clearly appreciate.

A recent class discussion with second year BSc IT students confirmed this. They were clear that even in the development of technology skills, such as programming and databases workshops, they found that the response of further questions that guided them towards the answer was much more valuable than being given the correct technical answer.

“We prefer to be prompted with questions when we have a problem with an exercise, rather than being shown the solution”.

They also appreciate the use of guiding questions in the more conceptual subject areas that I teach, where there are no single correct answers but only a range of contextually dependent good and better answers.

Another consequence of presenting questions, is that it develops a more general inquisitiveness to identify interesting questions.

“Something that I value a lot is that finding novel ideas for our assignments is constantly encouraged.” (G, Final year student)

This is clearly demonstrated in the way that my students develop their Independent Studies' research as they analyse their collected data and then identify additional aspects that need further data and analysis.

2.3.2 Iterative Formative Feedback and Mentoring – Solving Diversity

This approach is presented in section 2.1.5 above. It seems to be key a factor of the near elimination of the BMEI grade deficit on my modules.

“It is also reassuring that each student gets an equal amount of one-to-one time with Richard during a draft assignment (formative) marking session during each module. We receive advice on how to improve our work before the final assignment submission date, giving us an indicator of what grade we are on and what grade could be achieved.” (G, Final year student)

This approach both improves the overall grades, see Fig 5 above, and also seems to contribute to much of the reduction in the BMEI grade deficit, possibly as a result of valuing and treating each student as an individual.

“Through discussion with my peers I have found that they too feel the same - feeling valued as a student has had a lasting impact on me and has changed my perspective on education. It has also changed the way I approach my studies (for the better) and as a result of this I have found a significant improvement in my work over the years.” (L, Final year student)

3 Raising the Profile of Excellence

3.1 Introduction and Context

I am highly active in both the pedagogic context, in promoting the benefits of using the “Learning-to-Learn” model, and also in my academic domain of Big Data Analytics and Governance in both academic and business environments, as is demonstrated in this section. I have been both amazed and encouraged that giving my undergraduates the freedom to research at the leading edge of knowledge has resulted in external recognition in such a short time. From the start of the Location Services research in Oct 2014 to industry invitations for conference presentations was less than a year.

3.2 Within Derby University – Seminars, Presentations and PReSS Recipe Cards

I was appointed the School Learning and Teaching and Assessment Advisor for the School of Computing and Maths for the period 2013 /2014. During this appointment, I was able, using my then developing understanding of the Learning-to-learn academic, to enable and encourage the team of lecturers who supported one of the BSc computing programmes to significantly improve the NSS scores and levels of achievement.

I have given several presentations and short papers at events run inside the University, including Departmental seminars, the Annual University Collaborative conference and at one of the annual UoD Research Conferences in order to publicise the value of this approach and the need to use Academic Analytics to confirm the choices. The following are the main events.

In May 2015, I was asked to provide a short item on “Being a Successful Student and Employee”, at the Youth Development Conference organised by the University of Derby Student Union organised. This encapsulated my approach to developing the necessary soft skills for success, as a student.

In March 2015, I gave a contribution to the Department of Computing and Maths seminar series on some of the fundamentals of my pedagogic research on “Does Ethnicity Affect Achievement?” This resulted in debate about the transferability of the approach to technical courses, such as programming, which learning analytics has since answered positively.

“I learnt practical skills in SAS and research for presentations” (1st year feedback on good aspects of module)

As part of my Trans-national Education activities, based on a comparison of the results of one of my modules which is also run by a partner in Bangladesh, I presented a summary of the learning analytics of the module in the two locations called “Optimising student achievement in Collaborative Partnerships” at the annual UoD Collaborative Conference, Buxton in June 2015.

“Your YouTube videos of your seminars have been very valuable to help me and our students understand the subject and the assessment, especially because of the very different way that your modules work. But they very much like it.” (Partner Lecturer)

Richard John Self – University of Derby

In June 2015 I gave a contribution to the annual University Research Conference, “Students as Research Partners: I don’t do Research”, highlighting the positive impact of my students, as co-producers on the university’s reputation.

In July 2016 I presented a University workshop on Student Engagement.

In addition, I am capturing the essence of my approach in a set of five “Practical Recipes for Student Success” cards, an approach that the University of Derby has developed to capture and promote excellent academic practice.

3.3 National and International Academic Conferences

My contributions and professional reputation have developed strongly in the international field, with contributions in both pedagogy and domain areas.

In November 2013 I presented a joint paper on “Novel Approaches to Learning and Teaching SAS-based Analytics”, at the IBM Big Data Analytics EdCon, co-authored with Dave Voorhis.

I regularly contribute to the Toronto multidisciplinary International Journal of Arts and Sciences Conference, being invited to contribute keynote addresses and workshops relating to developing high student achievement, the reduction in the BMEI grade deficit and learning by immersive research.

I was also been invited to the 2016 IJAS conference for the Keynote address and to run a workshop.

“The workshop last year was a phenomenal success. I will have you open the research presentations once again, on “Inspiring Undergraduates to High Achievement in STEM subjects” and get them into the right spirit just like you did last year and then on the second day could you run a full-fledged workshop on "Giving Effective Presentations?” (Prof J Bonnici, Conference organiser)

I was invited by the IBM organisers to become co-chair of the annual Big Data and Analytics Educational Conference for 2014 and then in 2015. I was granted IBM Faculty Awards for 2014, 2015 and 2016 for services to the BDA EdCon international community. This conference series focusses on the development of curricula for schools, universities and for in-service Big Data and Data Science skills developments. BDA EdCon 2016 will call for research and excellent practice in developing the Learning-to-Learn agenda and be held at Derby.

I presented “Assessing Undergraduate and Postgraduate Hard and Soft Skills in Analytics and Data Science Courses” at SAS Global Forum 2016 and “Learning to Program using Immersive Approaches: A Case Study” at iLRN2016.

I have been booked to present a workshop at the University of Portsmouth’s Community of Academic Practice series in December 2016 on “Enhancing Student Engagement” as the result of being

“a highly regarded and internationally known practitioner and scholar”

3.4 National and International Business Conferences

My biggest surprise has been the demand for my contributions at business conferences over the last year and a half, as our reputation has developed in the Analytics and Governance field in general and in the Location Services field in particular.

I am now invited to contribute as session-chair, panellist and presenter by organisations that arrange business conferences for the communications, retail, healthcare and manufacturing industry sectors. The focus is towards the governance implications of big data, analytics and data science with topics such as:

- “Gaining Value and Trust in the Internet of Things and Big Data”
- “Maximising the Telco Opportunity in Big Data with Analytics”
- “Improving Location Accuracy with Assisted GPS”
- a half day workshop on “Addressing the Big Data and Analytics Skills Deficit”
- “Gaining Value from Location Services in Retail”
- “Governance of Big Data and the IoT to Gain Value for the Manufacturing Sector”
- “Big Data Analytics Driven Decision Making: Who Makes the Decisions, Man or Machine?”

Whilst presenting at such academic and industry conferences spreads the result of our research, it is also an invaluable opportunity to learn from others in a continuous cycle of learning, reflection and development which feeds back into both research and teaching.

4 Developing Excellence

4.1 Introduction and Context

This is based on deep reflection to apply the pedagogy of a research based learning strategy, with a strong focus on employability and using learning analytics to confirm the impact on student achievement.

Whilst it is appropriate to demonstrate my own pursuit of excellence in the section, I want to also demonstrate how this has resulted in my students also pursuing and achieving their own excellence. Without their pursuit of excellence, all my own excellence is of little value.

This part of my journey describes three different ways in which I have been able to help my students to excel.

4.2 Developing Robust Assessment Criteria for STEM Subjects

One of the problems associated with improving the quality of achievement is that often, the assessment criteria are posed in terms such as “reasonable attempt to apply” or “excellent application of knowledge to”, or are presented in terms of consistency with a stage in the HE journey, such as level 4 or 5. The consequence of this is that if high levels of achievement are obtained, it is often difficult to argue against a request for re-normalisation of the marks,

to bring the median grade back to somewhere around 55% - 65% with a standard, normal distribution.

It is, therefore, important to ensure that, whilst the assessment criteria are consistent with any Institutional guidelines, they also have some clear equivalence to some external, “objective” criteria in order that there can be no possible cause for re-normalisation.

I have developed assessment criteria which are both stretching and robust. The following example of the 95% mark band demonstrates one approach that the relevant external examiner has been enthusiastic about and praised both the form of assessment, the nature of the criteria and the valid, high levels of achievement.

Topic Criterion – “**Novel topic** that has been clearly articulated and also grounded in the existing literature. **Publishable in an international workshop**”.

The students are given guidelines to help them to gauge their topic’s novelty. Clearly there are other criteria, associated with this one to provide the total grade, however, the critical point here is that, as academics, we all understand the quality of research and critical evaluation that is associated with conference and workshop presentations at university, national and international levels. This, therefore, provides a robust external comparison of quality that is quite resistant to re-normalisation.

4.3 Employability Enhancement of Soft Skills for STEM subjects

A persistent complaint by industry, is that university graduates do not have the soft skills that are necessary to be effective employees. Recently (Nov 2015), the UK Chambers of Commerce have re-iterated the problem.

e-skills UK and SAS released a joint report in Nov 2014 which identified the hard and soft skills needed by graduates in the fields of Analytics and Data Science. We have used this report to significantly change the way that we run many of our technical modules and the assessment of the work.

The challenge has been to ensure that our students develop and are assessed on their soft skills of curiosity, problem identification and solving, collaboration, creativity, communication and story-telling rather than just the technical skills, which are normally assessed by demonstrations of the code and its use. This does not adequately assess the soft skills.

The new approach, closely modelled on business practices, is to assess the students’ work using a formal video presentation to critically evaluate the overall project, its justification, specification, design and implementation phases, and then critically evaluates the challenges and the insights gained from the overall project. This is supplemented by computer based tests of technical skills. The best are uploaded to YouTube and shared with the IBM Watson community. As a result of this I have been able to arrange for IBM to provide free access to all UK students to Watson Analytics for Students to engender an understanding of the value of data in all subjects to provide valuable insights, as part of the University’s objective to develop the digital skills of all of our students to fit them for the modern era.

4.4 Co-Producers in Research and Publication

My work over the last three years extends the work of Professor Mike Neary, at the University of Lincoln on the HEA funded “Student as Producer” project, into the area of leading edge domain research through their final year Independent Studies projects which leads to joint author conference publications. In addition, many of the module assessments result in formal research based articles

“... with the best assignments getting the opportunity to be published. I find it a great motivator when writing Richard's assignments to ensure that the assignment is of the highest standard. This allows us to get a good mark towards our University degree and to have something extra to stand out on our CV's for future job prospects. I got the opportunity over the summer of 2015 to help co-edit two sets of publications with Richard” (G, final year student)

The success of my recent journey could not have happened without the cooperation and enthusiastic support of my students who have made it very plain in module evaluations and other private communications that this approach works.

If they had not fully engaged in research based learning, both in individual module assignments and in their independent studies projects, we would not have become recognised as a leading centre of expertise in location services accuracy and big data governance.

Without their contributions to knowledge, I would not have had the background for my contributions to many of the recent business and academic conferences. It is unlikely that I would be chairman of the BDA EdCon conferences.

I owe the success of most of this journey to my students.