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Lynda Holland
The University of Wolverhampton, Lynda.Holland@wlv.ac.uk

Joy Garfield
The University of Wolverhampton, J.Garfield@wlv.ac.uk

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A SCAFFOLDED APPROACH TO TEACHING RESEARCH SKILLS TO POSTGRADUATE STUDENTS

Dr. Lynda Holland
The University of Wolverhampton, Wolverhampton, UK.
Email: Lynda.Holland@wlv.ac.uk
Dr. Joy Garfield
The University of Wolverhampton, Wolverhampton, UK.
Email: J.Garfield@wlv.ac.uk

Abstract

A recent re-validation of Postgraduate Awards and a move from fifteen to twenty credit modules provided an opportunity to re-think and restructure modules. This research looks at one specific module titled Research and Professional Skills which was restructured to implement a scaffolded approach to delivering the module aimed at increasing the students' confidence as well as their academic research skills. This research has shown that postgraduate students may have had little research experience during their undergraduate studies and that appropriate scaffolding is needed to support them developing research skills and has resulted in the formulation of a five step framework for developing postgraduate research skills.

Keywords: scaffolding, postgraduate, research skills, research skills framework.

A SCAFFOLDED APPROACH TO TEACHING RESEARCH SKILLS TO POSTGRADUATE STUDENTS

Introduction

A recent re-validation of Postgraduate Awards and a move from fifteen to twenty credit modules provided an opportunity to re-think and restructure a core module that teaches research and professional skills. This research looks at the way the module was restructured to implement a scaffolded delivery approach, aimed at increasing students' confidence as well as their academic research skills.

Educational change

Over the last two decades the UK government has pursued a widening participation policy that has opened up entrance to Higher Education (HE) to such an extent that the majority of young people now expect to attend University and obtain a degree (TLRP, 2009, p.1). Almost four decades ago access for the masses to HE was only a socialist goal. Traditional Elite HE had shaped the minds of the ruling class, but Mass HE, in theory, would prepare people for a broader range of technical and economic elite roles (Trow, 1973). The reality of Mass HE teaching however, has been condemned for dumbing down content and not producing quality graduates (Haggis, 2006, p.2). Despite this criticism, Mass HE is now moving toward Universal HE, whose primary aim is seen as adapting the population to rapid social and technological change (Brennan, 2004, p.24).

Most Higher Educational (HE) institutions now have international students on their courses. International in this context refers to students that have travelled to a different country from the one they are resident in to undertake tertiary education so their prior educational experience has been under a different educational system, in a different cultural context and possibly in a different language (Ryan and Carroll, 2005, p.3). In the 2009 to 2010 academic year international students accounted for 68% of all postgraduate students studying on UK full time, taught courses (UKCISA,

2010) and The British Council has predicted that international student numbers will continue to rise until at least 2015 (British Council, 2005). UK home students often struggle to cope with the transition from UK undergraduate to postgraduate studies, finding it difficult to adjust to the level of academic rigour required of them or to cope with subject specific language. International students face these problems and many others, such as adapting to different cultural norms, language difficulties; different teaching and delivery styles and different performance measures (Ryan and Carroll, 2005, p.6).

Currently although many students enter postgraduate studies with some basic research skills such as the ability to construct essays or to carry out research from books, they lack the level of academic thinking or critical writing skills required for postgraduate scholarly writing (Harris 2006, p.136). Postgraduate study requires significantly different research and writing skills from undergraduate studies, something students often do not realise (Buck & Hatter, 2005; Granello, 2001). According to Brew (2006, p.44) staff expect that postgraduate students will "already have had considerable experience in investigation, in project research, and in inquiry based learning". This can result in a gap between the expectation of staff and the actual performance of the students, which has been linked by Froese, Gantz and Henry (1998, p.103) to poor instructional delivery. Granello (2001) claims postgraduate teaching often focuses on definitions and instructions but does not provide students with a clear enough understanding of what they are required to do. Postgraduate students have been shown to learn best when they are supported, engaged, challenged, have good models to work with, and opportunities to practice and receive feedback (Piercy, Sprenkle and McDaniel, 1996, p.164) or undertake structured exercises (Johnson, 2008, p.277). Schroeder (2004, p.1) believes that students are now unable to cope with abstract ideas and are less independent in thought and judgement so they require a practice-to-theory approach in teaching rather that the traditional theory-to-practice approach.

Educational use of Scaffolding

Scaffolding is an educational term used to describe supportive elements added to a program in order to help students develop a higher level of understanding (Dickson, Chard, & Simmons, 1993; Larkin, 2001). Bruner (1966) first coined the term 'scaffolding' to provide a temporary framework in the form of support for learners.

Scaffolding parallels Vygotsky's Zone of Proximal Development (1978), which is the distance between a student's ability to perform a task without help (e.g. solving a problem independently) and with help (e.g. under the guidance of a tutor and/or through peer collaboration). Successful teaching depends on identifying the area that is just beyond the students current abilities which can be difficult when a diverse group of students is involved. Freire (1984) argued that any pedagogy should have demonstrable relevance to the immediate worlds of the students and must enable them to analyse, theorise and intellectually engage with those worlds. In order to learn in a deep way (i.e. to fully understand concepts) it is widely acknowledged that students need to be cognitively engaged through thinking, reasoning, analysing and/or problem solving. This contrasts to surface learning which tends to be more passive in nature and involves students memorising knowledge and regurgitating it at exam time. Harris (2010) suggests that more diverse, and in many instances more complex students with a varied range of needs require a learner-centred approach to learning, both in teaching and the variety of support and administrative systems which underpin delivery.

Scaffolding provides a method of supporting various learning styles and learning experiences (Kame'enui et al., 2002; Kirk et al, 2006; Salend, 2001) by "actively diagnosing student needs and understandings, providing tailored assistance and specific feedback, and controlling for frustration and risk" (Larkin, 2002, p.30). It also provides "multiple co-occurring and interacting supports for the same need" (Tabak, 2004, p.307). Scaffolded learning builds on constructivist theories of learning which emphasise the active role learners take in constructing and organising their own individual knowledge schemas (Duffy and Jonassen, p.64). The challenge is how to assist students to make links between new knowledge and what is in their existing schemas (Ryan and Carroll, 2005, p.14).

Background to the module

This research is essentially a descriptive case study which collected information from only one institution (Kane, 1990), a post 1992 University or former Polytechnic with an unrivalled widening participation policy that fosters social inclusion (Gipps, 2006, p.2). During 2010-2011 the University underwent an extensive reorganisation and revalidation of its postgraduate curriculum which resulted in modules changing from

fifteen to twenty credits. Under the old award structure modules were delivered in block mode, over three full days. Block mode delivery had been chosen because the award attracted a high number of part time students, many of whom were in full time work and preferred attending classes over one long weekend, instead of on a weekly basis. Block mode delivery meant that students studied only one module at a time and once the initial three day delivery period was over, students had one more two hour tutorial session with module staff where they could receive feedback on their work before submitting their assessment. Over the last five years the makeup of students on this award gradually changed from predominantly working adults to predominantly full time international students who often arrived in the UK literally a day or so before attending their first class.

The award included a skills module, the forerunner to the module that is the focus of this research, which aimed to develop students' academic and research skills by introducing them to academic writing, academic research sources; research methods, research ethics and referencing. Assessment for the module focused on students critically analysing journal articles and preparing their dissertation proposal. The dissertation proposal element was modified three years ago after feedback that students found it difficult to put together a research proposal in the first semester of their studies; therefore this element became a mock dissertation proposal worth a smaller percentage of the overall marks. Despite this change the module experienced a continually falling pass rate. Students struggled with all the concepts the module covered from writing a mock proposal to finding suitable academic literature. A follow on module in semester two where students prepared their actual research proposal and started their literature review had similar problems. The students had clearly failed to grasp the basic concepts of conducting research and were unable to prepare research questions that allowed them to collect and analyse data. It was noticeable within the same time period that requests for extensions became a regular occurrence, despite the majority of students not working and only studying one module over a six week period, many kept putting off starting their assessment work, possibly because they did not know where to begin.

Revalidation presented an opportunity to make important changes to the award this module is a part of. The most significant change was a restructuring of module

delivery from block mode, to day time delivery over a nine week period to reflect the change from predominantly part time, to predominantly full time students. This change meant that students would now study two modules concurrently, but have five hours contact time for each module, each week. Once the delivery pattern was established module teams then had to decide how to restructure their module. A decision was taken for the Research and Professionalism module that instead of adding extra material to fill the additional contact time, some content from the previous module would actually be removed and the module team would focus on developing the students understanding of basic research concepts. The learning outcomes for the module meant that the assessment still needed to cover the same areas, but the teaching each week was re-structured so that students were taken step by step through each of the individual tasks they needed perform in order to produce each assessment in class by providing them with a series of examples to work through. Module delivery was over two days, one three hour session on a Monday and a two hour session on Tuesday. The module team decided that the two hour session would not be used to deliver new material, it was set on one side for feedback and for going back over any 'muddy points' that students may not have understood (Angelo and Cross, 2006, p.2). In order to ensure that the students actually worked on the assessment out of class it was decided that they would be set work to complete each Monday which would be brought to the Tuesday class and that they would also be asked to submit a draft of their work each Friday to receive feedback the following week. Looking at the students work on a regular basis would enable staff to pick up on any areas where the students were struggling to understand what was required of them. These topics could then be discussed with the class during the feedback sessions and extra scaffolding put in place if needed. The mock research proposal that had previously been an individual piece of work was changed to a group presentation which the students would work on for the first five weeks of the module. Working in a group would give the students an opportunity to see the way other people approached the task, to share ideas, make new friends and as the module was one of the first they were undertaking at the University this approach would also provide them with a support network while they settled into their studies. It would also enable the students to develop the professional skills of team working and delivering a presentation. The critical review remained an individual piece of work and an individual piece of reflective writing was added.

Methodology

Action research is open ended and does not have a fixed hypothesis, therefore it is a form of self-evaluation aimed at improving performance and is often used to investigate educational issues because it combines diagnosis with action and reflection (McNiff, 2002, p.15). It is also participatory in nature, requiring researcher and client collaboration, and follows a number of steps. Firstly the problem must be diagnosed and defined; then alternative options considered and finally changes implemented (Bryman, 2001, p.275; Pring, 2004). This research was essentially action research, aimed at improving educational delivery on one module (Stringer, 2004, p.9). As the module ran over a nine week period it offered the opportunity to carry out action research that could be responsive to research participants' needs, which had not been an option when the module ran in three day block mode. This research utilised a number of different ways to collect and process information; a series of questionnaires were administered to give the students the opportunity to feedback on any issues they did not want to discuss with staff; weekly feedback was used as outlined above and focus group discussions were held in class. The extended delivery time meant data could be collected, but it had to be analysed quickly in order for changes to be made to the module from week to week. To do this required commitment from the teaching staff to spend more hours working on the module than their workload allowance provided and a willingness to actively participate in the module.

Academic background of students

Twenty five attended the module and on the first day the students were given a questionnaire to complete in order to gauge their previous educational and research experience. In total twenty three students completed the questionnaire. Out of the twenty three only two of the students were female, although this is not unusual as research has shown that only 15% of students accepted on IT degrees are female so a gender imbalance on the module was expected (e-skills, 2011; Bryne & Lyons, 2001; Jagger, 2010). Four of the students were UK citizens, the rest came from Nigeria, SriLanka, Cyprus, China, India and Thailand. Twenty two of the students had an undergraduate degree. When asked what the average grade for their undergraduate

work was 65% claimed they achieved an average C grade; 30% an average B grade and the remaining 5% an average A grade.

The questionnaire then focused on asking the students about their previous research experience as undergraduates. They were asked if they had carried out a research project as part of their undergraduate studies, 21% of the students had not. When asked what methods the students had previously used to analyse information they had collected for undergraduate assessments only four students had any experience of collecting and analysing primary or secondary data. The other students had only researched topics that required descriptive writing. This result was quite surprising but only 26% of the student's undergraduate degrees had included tuition on research methods. In order to get an idea about the student's past writing experiences they were asked the maximum number of words they had written for an assessment during their undergraduate degree. Replies to this question showed that the median number of words was 8000, the maximum 15,000 and the minimum 2000, showing a quite significant difference in past writing experiences. Only two students had written 15,000 words.

The questionnaire went on to ask about previous research sources the students had used. All the students said that they had used books, but only 56% had used journals at all and the other 44% had used only newspapers and materials found from websites to supplement information from books. Rather surprisingly given the research sources they identified 43% of the students claimed they had previously received tuition on how to identify academic and non-academic sources. Half of the students claimed to have used Harvard referencing before, although only 17% of students said they were confident users, while 34% said they were not confident at all. Only 21% of the students were confident that they could write a bibliography and a reference list. Only 21% of the students had tuition on research ethics included as part of their undergraduate studies.

Findings

Assessment 1 - The mock project proposal

As already mentioned this assessment required preparation of a mock research proposal. Teaching for the module had been structured so it took the students week by

week through each step they needed to carry out in order to complete the assessment. For the first assessment the students were given weekly tasks that the group needed to accomplish, which fitted together to form their research proposal. Week one covered how to write a research question; week two, how to reference, prepare an annotated bibliography and write a literature review; week three, research ethics and methodology; week four, data collection and questionnaire design.   Also in week one the students were provided with a list of topic areas they could choose for their research proposal and put into teams to work on selecting a topic and developing suitable questions. They were given help from staff in developing possible questions and feedback on the appropriateness of the questions they developed. Despite receiving feedback, at the end of the week when the students submitted their first draft for this piece of work it became clear that they had still not understood what they were required to do; or what made a good research question. The questionnaire relating to the students educational backgrounds had been analysed by this time and staff quickly realised this was because most of the students had no prior experience of formulating research questions. For the week two workshop therefore individual group sessions were timetabled to allow each group to discuss in depth their research ideas with a member of staff who helped them develop more viable research questions.

At this point the staff felt that the students would be able to progress quite well with the assessment because they had overcome the worst hurdle, they had a research question. This proved to be wrong. The students' next task was to find three academic journal articles that related to the topic of their research question, so they could use them to prepare an annotated bibliography and a short literature review. In order to do this the students were taken to the University library to have a demonstration of full text academic journal databases. The session had been optimistically scheduled to last for one hour, which staff thought would allow enough time to demo the databases and enable the students to find the journal articles they needed. This session lasted for approximately two and half hours, after which time some students had still not found the academic journal articles they needed. The response to a lack of success in locating relevant articles led to several groups wanting to change their research question, which was supposed to have been based on initial research carried out by the group to establish availability of sources before they chose the topic. Some students

also found it challenging to distinguish between a conference paper, journal paper, report and technical magazine and surprisingly in the information age they also found the databases difficult to use and kept going back to use the OPAC whose interface they found easier to use. The students also struggled to find appropriate keywords so they could locate relevant articles despite an in-class task aimed at preparing a research strategy in advance of the library session. After the library workshop staff helped each group of students identify journal articles they had retrieved as either academic or non-academic and to further work on their search strategies by preparing synonyms. This additional support did mean that suitable articles were eventually located by all the groups. The final two weeks of working on this assessment focused on the student preparing their annotated bibliography and literature review. The annotated bibliography most of the students found relatively easy to prepare because it required commenting on only one source at a time. The literature review proved more difficult as they needed to weave together different sources and additional support beyond the lecture and tutorial materials were needed in the form of sample literature reviews and feedback from staff.

The groups were all able to construct their presentation with no help, so they appeared to be competent users of PowerPoint. Each group also delivered relatively competent presentations. Interestingly at this point in the module some students clearly found it easier to discuss research concepts than they did to write about them. One group which had poor slide content competently answered all the questions they were asked about their research project and methodology; they had simply struggled to express their knowledge in writing.

A questionnaire on team working was filled in by the students after they had completed this section of the assessment and asked the following questions which expected only Yes/No answers:

1. Did working as a team help you to generate ideas for the assessment?
2. Did working in a team help you to understand how to prepare research questions better?
3. Did you get to know any new people as a result of working in a team?
4. Did working in a team give you more confidence?
5. Did you find it useful to do Assessment 1 as part of a team? Please explain

6. Did your team encounter any problems? If so were they a result of a lack of communication or a specific team member?
7. Do you think this assessment would have been better if it was NOT team work but individual?

Twenty three students completed the questionnaire. The answers to all of the questions was quite uniform with 82% of the students answering questions 1,2,3,4,5 and 7 with Yes. Clearly the majority of the students preferred working in a group. Only two students would have preferred the assessment not to have been team work, although strangely they both thought that working in a team had helped them make friends, had given them more confidence and had helped them to understand what made good research questions. Surprisingly many of the students' added additional comments after answering Yes or No, some of which are shown below:

- *'The research seemed difficult at the initial level, but by sharing the areas and combining our different knowledge base it could be seen that we learnt more ... we made friends and learnt a little bit about our cultural backgrounds ... it built confidence and showed different ways or techniques being used by colleagues in developing ideology behind research question'.*

- *'The criticism I received from team members was constructive. They also offered different perspectives when going over the research question and made working on the assessment quicker by sharing tasks and taking turns in the final proof reading'.*

- *'Working in a group provided more ideas, we changed our questions many times so working in a team helped us to find right questions in the end --- assessment 1 provided me to understand lots of issues about the module. It was very useful for future works as part of a team'.*

After this assessment the students were introduced to Turnitin, the academic plagiarism detector, as a formative learning tool. Their annotated bibliographies and their literature reviews had all details relating to group members etc. removed and were put through the system. One groups work scored a 65% similarity; the rest had scores that ranged from 10% to 40%. On closer inspection the group with the highest similarity score had used a lot of quotes in their work which accounted for part of the result. All of the groups had some elements of their work identified by the system as 'cut and paste' sections from the original article, but generally speaking these were

limited to no more than one or two lines. The students found it useful to look at all the pieces of work and to be talked through various aspects identified by the software. They were allowed to set up accounts for themselves on the system so they could run assessment two through Turnitin and so they could receive feedback from the academic support unit on their English and grammar for this piece of work. The students all claimed that they had found being introduced to Turnitin useful, some of their comments are shown below.

- *'How it operates is amazing'.*
- *'It got me thinking how important are paraphrasing, referencing and citations to avoid plagiarism'.*
- *'It has given me knowledge about avoiding plagiarism and how to adequately reference any material used as applied information to my research'.*
- *'Very useful because it gives me the motivation to start writing articles in my own words, which is important in academic set up'.*

Some students were also surprised that Turnitin actually exists and was not a myth spoken about by tutors to try and discourage plagiarism.

Assessment 2 – The Critical Review

The critical thinking according to Brookfield involves the ability to identify and challenge assumptions and the ability to consider alternatives. The critical thinking process is person specific and varies according to culture, gender and emotions, often taking place after a period of frustration and struggle (Brookfield, 1987, p.231.). The second piece of assessment work involved the students carrying out a critical review of the three journal articles they had located and used for assessment one. Before they started this part of the assessment a lecture was given on critical writing techniques and a variety of in class exercises were worked through with the students to provide them with practice of critically analysing different types of sources. The students were then provided with scaffolding in the form of a critical review worksheet to help them identify various information within academic journal articles that they could compare and analyse. They were asked to prepare a worksheet for one of their papers overnight and to bring it to the tutorial the next day along with their other two papers. At the tutorial it became clear that although the students had been able to locate relevant information with the help of the worksheet, they now had no idea what to do with the

information or how they should structure a critical review. According to Harris (2006, p.138) postgraduate students often read the assessment, ask questions in class but still fail to understand the work they have been set to do, which seemed to be the case. To overcome this problem three other scaffolding templates were quickly provided for the students: a suggested framework for the critical review they needed to prepare; a grid that showed them how they could analyse the reference lists of the three journal articles and a very brief sample critical review. These additional supports made all the difference to the students. They provided them with the confidence they needed to move forward with the assessment task and after introducing them it was clear to staff that students had a more positive attitude to the task and now felt they knew what to do.

A questionnaire relating to assessment two asked the students how useful they found the scaffolding templates they had been provided with. A likert scale of essential/useful/no use, was used for replies, 64% of the students felt the templates had been essential for them to complete the task; 36% said they were useful in helping them complete the task and none of the students felt the templates were of no use. Once again a few of the students added extra comments to the questionnaire, which are shown below:

- *'All the above things have proved very useful for me, now I have an idea to attend or write academic writing!'*
- *'Before taking this module I know just a little about critical academic writing or critical review but now that I pass through the module I know much more and can confidently handle or write a good critical review'.*
- *'I have learned a lot from doing research on journals or academic materials to critically evaluate them. I feel confident now (50%) when researching for academic materials that I can identify them. Thanks'.*
- *'It was a great learning experience thank you!!!'*

It would appear from the these comments that identifying issues students were struggling with at an early stage and providing them quickly with additional support structures was key to them successfully completing this part of the assessment.

The majority of the students, 73% had no prior experience of identifying ethical research issues, but when asked how confident the students were that they would be able to identify ethical research issues after completing the module, 84% said they now felt confident that they could identify ethical research issues, 1% said they were not confident and 15% that they were very confident.

All the students agreed that they had found the feedback they had been given for this assessment very useful, their comments included:

- *'The feedback I received on critical writing was very useful from me to complete my second task'.*
- *'The feedback gave me the opportunity to go back to the work and think critically on my writing'.*
- *'Feedback enabled improvement'.*
- *'Some of the hidden errors were pointed out for me. and it gives me the room to further added some suggestions made by my tutor'.*

It would appear that providing feedback on a regular basis was appreciated and that the students did use the feedback to make changes to their work.

Assessment 3 – The students' reflections

The majority of the students, 84%, had no previous experience of reflective writing and just over half the students found the concept of reflecting difficult to grasp. One student said that he "Found it a little difficult, because I was analysing myself before, during and after the various course work, lessons I had learnt and also practiced and avoiding being totally descriptive was a major problem". Students were encouraged by the lecturer when giving feedback to be less descriptive and more evaluative, always asking themselves why and how could they improve for the future.

Conclusion

The students responded well to the new teaching structure. They worked hard on the in-class tutorial exercises and were willing to contribute to group discussions and to become involved in discussing issues relating to the module. In some cases the students recognised that their previous studies had not prepared them at all for the study environment they were now experiencing. For some of the international students in

the group the critical review and reflective essay were the first pieces of work produced on their own. Assignments that they had previously completed were produced by altering a few words from the work of past students and other sources, which was accepted practice.

For module staff, providing the level of support these students received required considerable time commitment which was made possible due to the small size of the class. Because the module staff spend so much time looking at the students work they were able to see more clearly areas that the students found hard to understand which was essential for providing adequate and appropriate scaffolding. The longer delivery period also enabled the students to form a better relationship with the lecturers on the module and this facilitated the feedback of 'muddy points' which was essential to identifying issues the students were struggling with.

This research has enabled the development of a potential framework (table 1) that can be used to support postgraduate students in developing their research skills.

Five Step Scaffolding Framework	
Step 1	Design a clear assessment that can be completed step by step, is aligned to teaching and has outcomes identified within the assessment grid. Ensure the assessment is explained clearly and linked to the feedback grid.
Step 2	Develop a worksheet based approach and provide formative in-class and out of class exercises to give the students experience of applying the principles being covered.
Step 3	Have students work on different parts of the assessment each week and give feedback frequently.
Step 4	Collect data on a regular basis by the development of questionnaires to gain feedback on progress and inform specific scaffolding techniques to construct
Step 5	Provide worked examples of acceptable structures for assignments and frameworks to show how to identify, collect and critically analyse data

Table 2. Five Step Scaffolding Framework

The five steps work together to support students through the various stages of the assessment by constantly monitoring their progress and providing targeted support

when needed to help students identify what they are expected to do and how they should go about doing it.

Graph 1: Module grades
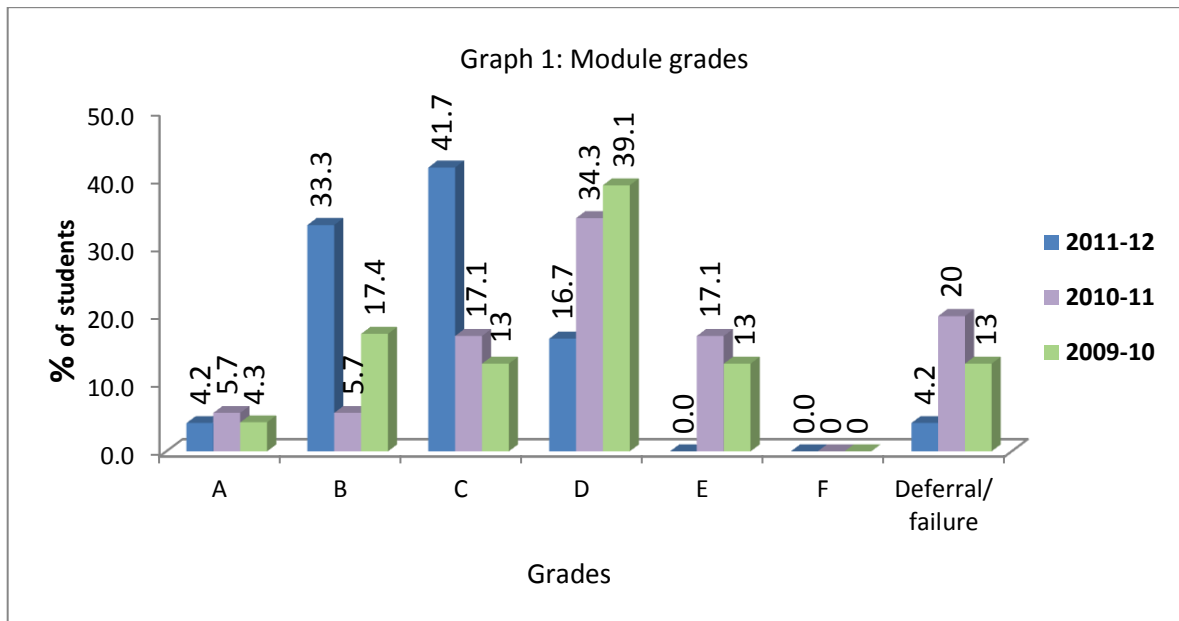
When the grades for the module over the past three years are compared (graph 1) then the module using the five steps has clearly resulted in improved grades for the majority of the students with more achieving C and B grades. It will be interesting to monitor this group of students to see if higher grades are also achieved when they complete the research project module.

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