Overview
In this module, you will complete a project on chemistry education, mathematics education or physics education. Your project may be in the context of the Irish second level education system, but you are not restricted to this. It will combine mathematical and/or scientific content knowledge, teaching experience, pedagogical knowledge and the use of technology. The aim is to synthesise the different types of knowledge and skills that you have developed over the course of the degree to produce a substantial piece of work that informs chemistry/mathematics/physics teaching.

Project Marking Scheme
You total project mark is based on a combination of 5 different elements:

(i) Development of Research Proposal (5%)
(ii) Project Report (80%)
(iii) Presentation (15%)

Development of Research Proposal
To begin your project, you should identify a research question or problem that you wish to tackle. This can be informed by your own curiosity, your experience of teaching and assessing, ideas that you have met elsewhere in the degree, an article that you have read in a journal, magazine or newspaper or any of several other influences. Different supervisors may assign topics or provide a list of topics from which you can choose. It may be helpful to keep in mind that a research question is often very close to the title of a research article, e.g.

Title: Gender differences in the acquisition of hand-tool skills among Congolese bonobos.

Research question: To what extent are there differences between the genders in terms of the acquisition of hand-tool skills among Congolese bonobos?

You should also describe you proposed research methodology: how will you answer your research question? This exercise will provide the essential first component of your final year project.

Assignment

Please write a 2 page document (12pt Times New Roman font, single spacing) describing your research question and your proposed research methodology. This must be submitted to your supervisor by Friday 14th February. Supervisors will be available to discuss research proposals before this date. This exercise is worth 5% of the project total.

Grading guidelines
The assignment comprises two elements which will be graded on the following criteria:

**Research question**
Is your research question valid? – is it a question that can be answered? Is it coherent and clearly expressed? Have you given a good rationale for your research question? – why are you proposing this research question?

**Research methodology**
Is the methodology you propose consistent with and appropriate to your research question? Is it coherent and clearly expressed? Does the description of your methodology include an appropriate plan for its execution?

**Literature Review**
The next part of your project involves finding out what work has already been done on your research question – this is called a literature review.

In carrying out any kind of research or development project, it is important to determine what work has been done before on the topic. This is done by carrying out a review of the relevant literature. Relevant literature is usually in the form of books, peer-reviewed research papers published in print journals, in conference reports and on-line, and reports by government and other agencies. Published material that has not been subject to independent review should be treated cautiously, e.g. newspaper articles, some on-line resources (including Wikipedia!), blogs etc.

The aims of the literature review are twofold. First, it will allow you to find out what has been done before on the topic of your project. This will provide a context for your work; it will allow you to avoid re-inventing the wheel and will help you to avoid the problems encountered in previous work. Your research for the literature review is also likely to influence the direction of your project work by providing ideas that might not have occurred to you otherwise. Second, it will allow you to communicate the information you have gathered and so, in your final project report, explain the context of your work and show what distinguishes it from what has been done before.

Your review should be critique of the literature on your topic: it should not simply comprise a list of results and ideas presented elsewhere. You should try to identify what was the most important work done on the topic, and why this work was more important, both from the point of view of the development of the area and the outcomes of the research and ideas presented.

You should pay particular attention to how the existing literature relates to the Irish mathematics/science teaching context and to what its implications are for your project.

**Report Submission**
You must submit your Project Report before [date TBA; around end of Semester 2]. You must submit two soft-bound copies of your report and also provide an electronic copy. This must be e-mailed to your supervisor by the deadline, and the bound copies must be submitted to your supervisor or their school office. In the latter case, please ask the recipient of the copies of your report to note the time of submission.

Late submission

Late submissions will be penalised by the application of a weighting factor to your Project Report mark.

Project Report Structure

For your report, please use Times New Roman 12pt font, single spaced, with the same borders and margins as this document. Your submission should comprise the following:

- A title page structured as in Appendix 1 of this document.
- A signed submission page structured as in Appendix 2 of this document.
- A table of contents (word processors have tools for automatically generating tables of contents – just check the help files).
- The main body of the report, sectioned appropriately. This should be typed in 12pt Times New Roman font, using the margin, line and paragraph settings of this document. It should be no longer than 25 pages in length (not including the title and submission pages and table of contents). You may also include up to 10 further pages of appendices that are of direct relevance to your project report.
- Your Literature Review should be included as a chapter of the report.
- Appendices should be included if needed. Worksheets, questionnaires etc should be included in the appendices rather than in the main body of the report.
- Reference list, following the Harvard system.

Project Report Assessment Criteria

In your Project Report, you should give a full account of the project that you have carried out. This may include the following – not all of these may be relevant to your project, and you are not restricted to these topics: the background and motivation for the project; your research question; the aims of your project; your research methodology and its implementation; the development of curriculum or other materials; the delivery/application of those materials; an assessment of the outcomes of your project work; conclusions drawn from your work. Your literature review should be included in the Project Report and you should use what you found out in your review to support your project and the other elements of your Project Report. Your Project Report will be assessed on the following criteria.

- Merit of the project. Have you carried out an interesting and insightful piece of work that furthers our knowledge of maths/science education or contributes usefully to the field? Is the rationale for your work clear and have you clearly stated your
research question? Have you clearly stated your aims? Are the aims and objectives valid – can they been assessed? Have you used appropriate research methodologies? Are your conclusions supported by the work that you carried out? Is the mathematical/scientific content of your project correct? Are your reviews or other data collection and data analysis methods valid and appropriate?

- Appropriate use of existing literature. Have you integrated into your project and your report what you have found out about previous work on the topic? Does this include a broad range of sources on your topic and indicate that you have read and interpreted these in detail and identified the most important results and ideas that are in the published literature?

- Clarity of content and structure. Is your report clear, comprehensible and well-written? Are diagrams, figures and tables clear and appropriately positioned in your report? Do the different parts of the project link appropriately with one another?

- Syntax, spelling and grammar. Do you care that somebody will be reading what you have written, and have you taken due care with syntax, spelling and grammar which are crucial components of effective communication? Have you used grammatically correct sentences in your writing? Have you carefully reviewed your work before submitting it?

- Citations and references. Have you cited all your sources properly in accordance with the Harvard system?

- Plagiarism. Have you made sure that you are not presenting someone else's work as your own?

Presentations

The purpose of the presentations is for you to describe the key details of your project. What were you trying to find out? How did you do this? What were the results? What are your conclusions? These will take place on [dates TBA]. You will be allocated 15 minutes to present the work done in your project, followed by 5 minutes for questions. **Please ensure that you are available for the whole of these days.** As well as the assessment criteria headings given above, your presentation will be assessed on your success in giving a clear and comprehensive account of the work you carried out in your project.

Marking Guidelines

The following paragraphs give a rough outline of the characteristics that a project awarded a mark in the band indicated would have. These guidelines are not prescriptive; their purpose is to contribute to the determination of consistent and fair marks for projects that differentiate appropriately between projects of different standards.
85-100 (1st Class Honours)

- The report is very well organised, with appropriate use of sections, sub-sections, paragraphs and appendices, with well-thought-out use of diagrams, figures and tables.
- The report shows excellent use of clear and logical language and arguments.
- The report evidences a very high level of insight and critical thinking in relation to the key issues dealt with in the project.
- The ideas in the report are consistently interesting and original.
- The report makes excellent use of existing literature, providing insightful evaluations and integrating this literature with the project.
- The report shows excellent judgement and understanding in the areas of the selection of research methods, data collection, data analysis and interpretation of research results.

For a mark in this range, the report should show excellence and a high degree of originality in all of the headings listed under Assessment Criteria.

70-84 (1st Class Honours)

- The report is well-organised, with appropriate use of sections, sub-sections, paragraphs and appendices, with well-thought-out use of diagrams, figures and tables.
- The report shows very good use of clear and logical language and arguments.
- The report evidences a high level of insight and critical thinking in relation to the key issues dealt with in the project.
- There are several interesting, original ideas in the report.
- The report makes very good use of existing literature, providing insightful evaluations and integrating this literature with the project.
- The report shows very good judgement and understanding in the areas of the selection of research methods, data collection, data analysis and interpretation of research results.

For a mark in this range, the report should show excellence and originality in most of the headings listed under Assessment Criteria.

55-69 (2nd Class Honours – Grade I, upper Grade II)

- The report is well-organised, with appropriate use of sections, sub-sections, paragraphs and appendices, with well-thought-out use of diagrams, figures and tables.
- The report shows good use of clear and logical language and arguments.
- The report evidences a good level of insight and critical thinking in relation to the key issues dealt with in the project.
- There are some interesting, original ideas in the report.
The report makes good use of existing literature, providing insightful evaluations and integrating this literature with the project. The report shows good judgement and understanding in the areas of the selection of research methods, data collection, data analysis and interpretation of research results.

For a mark in this range, the report should show a good level of attainment and some degree of originality in all of the headings listed under Assessment Criteria.

**40-54 (2nd Class Honours – lower Grade I, 3rd Class Honours)**

- The report is adequately organised, with appropriate use of sections, sub-sections, paragraphs and appendices, with well-thought out use of diagrams, figures and tables.
- The report shows adequate use of clear and logical language and arguments.
- The report evidences a reasonable level of insight and critical thinking in relation to the key issues dealt with in the project.
- The report contains some interesting ideas, but these are not necessarily original.
- The report makes use of existing literature, providing some evaluation and integrating this literature with the project.
- The report shows adequate judgement and understanding in the areas of the selection of research methods, data collection, data analysis and interpretation of research results.

For a mark in this range, the report should show an adequate level of attainment in all of the headings listed under Assessment Criteria.

**0-39 (Fail)**

- The report is poorly organised and lacks appropriate use of sections, sub-sections, paragraphs and appendices. The use of diagrams, figures and tables is poorly thought out.
- The language and arguments of the report lack clarity.
- The report lacks evidence of insight and critical thinking in relation to the key issues dealt with in the project.
- There is a lack of interesting ideas in the report.
- The report does not make appropriate use of existing literature, failing to evaluate this literature and fails to integrate it into the project.
- The report shows poor judgement and understanding in the areas of the selection of research methods, data collection, data analysis and interpretation of research results.

Marks in this range will be awarded to project reports that fail to show adequate levels of attainment in the headings listed under Assessment Criteria.
**Plagiarism**

Plagiarism refers to the presentation of the work of other people as your own. There is a spectrum of behaviours here, ranging from blatant and conscious copying to making errors in referencing others’ work. It is considered a serious academic offence: see the DCU policy on plagiarism:

http://www.dcu.ie/registry/examinations/regulations.shtml#15

This policy does not exclude the use of (say) a direct quote (or diagram, table etc) from another source: the key is to be clear about the origin of the quote (or etc) by giving a proper reference. For example, consider these two versions of a discussion of concept image in mathematics:

Version 1:

Concept image refers to all of the things that a person associates with a particular mathematical concept. It corresponds to the total cognitive structure that is associated with the concept, which includes all the mental pictures and associated properties and processes. It is built up over the years through experiences of all kinds, changing as the individual meets new stimuli and matures.

Version 2:

Concept image refers to all of the things that a person associates with a particular mathematical concept:

> It corresponds to the total cognitive structure that is associated with the concept, which includes all the mental pictures and associated properties and processes. It is built up over the years through experiences of all kinds, changing as the individual meets new stimuli and matures. (Tall and Vinner, 1981, p.152)

In Version 1, the writer is implicitly presenting the sentences beginning “It corresponds…” as their own description of concept image. This is considered to be plagiarism. In the second version, it is absolutely clear that they are quoting other authors: this is perfectly valid. (Note that in light of the paragraph above about putting together a critical review of the literature, we would expect to see some further original comment on concept image in both Version 1 and Version 2.)

The general rule of thumb regarding plagiarism in the context of a literature review is that once you have properly referenced your source, you will be ok. Which leads us to…

**Referencing**

There are two main systems of referencing in formal written reports, known as Vancouver and Harvard. The latter is generally preferred in social science (including education), so please use this system in your literature review and in your final
written project report. A local guide to the use of this system of referencing is available here:


Other material on the general topic is available at this library website:

http://www.dcu.ie/~library/classes_and_tutorials/citing.shtml
Appendix 1 - Sample front/title page

BSc in Science Education
Final Year Project

Project Title

Name: AN Other
Student Number: 12345678
Supervisor: Prof J Doe
Date: 1st May 2014
Appendix 2 - Sample signed submission page, to immediately follow the front/title page.

I declare that this material, which I now submit for assessment, is entirely my own work and has not been taken from the work of others, save and to the extent that such work has been cited and acknowledged within the text of my work. I understand that plagiarism, collusion, and copying is a grave and serious offence in the university and accept the penalties that would be imposed should I engage in plagiarism, collusion, or copying. I have read and understood the project guidelines. I have identified and included the source of all facts, ideas, opinions and viewpoints of others in the assignment references. Direct quotations from books, journal articles, internet sources, module text, or any other source whatsoever are acknowledged and the sources cited are identified in the references. This report, or any part of it, has not been previously submitted by me or any other person for assessment on this or any other course of study.

I have read and understood the referencing guidelines recommended in the project guidelines.

Signed: ______________________________

Name (printed): ______________________________

ID Number: ______________________________

Date: ______________________________