TEP 433

Science in the Secondary School I

S1 Day 2015

Dept of Education

Contents

General Information

Unit convenor and teaching staff
Lecturer
Hye Eun Chu
hye-eun.chu@mq.edu.au
Room 809, Building C3A

Credit points
3

Prerequisites
TEP388(P) or TEP395(P)

Corequisites
TEP401

Co-badged status

Unit description
This unit builds on TEP388 and introduces students to modern approaches for the teaching and learning of Science in secondary schools. Curricula, resources and instructional strategies appropriate to teaching Science are examined, with particular attention to years 7-10 and Senior Science. It is linked to the school experience gained in TEP401.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

A knowledge of the changing policy context of secondary schooling in NSW (BOSTES, NSWDET) and Australia (ACARA) with specific reference to science

The ability to plan and present sequential lessons based on evidence collected during the professional experience (TEP401)

A developing knowledge of both formal and informal assessment procedures in current use in secondary science classrooms

The ability to reflect on and critique one's own professional practice with due regard to the input provided by experienced science teacher(s)

A working knowledge of the relevant syllabus science documents from both the BOSTES (NSW) and National Curriculum (ACARA)

The ability to interpret research findings both in science and science education and relate these where appropriate to adolescent's understandings in science, their lives and to current syllabus documents

To think critically about their use of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage students with science

A developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation

General Assessment Information

The central purpose of the three assignments is for you to develop an understanding of how science teachers conceptualise areas of interest in science classroom practice, and what ideas and notions about science pupils bring with them into the science classroom. It is hoped that these assignments will be of assistance to you in terms of becoming better acquainted with the complex task of teaching and learning science from the perspective of both teachers and pupils. In addition, the assignments are designed in such a way as for you to question your own preconceptions about teaching and learning and to develop, articulate and rationally defend your thinking about science teaching. To achieve these purposes all assignments must be informed by relevant research and professional knowledge and be grounded in the analysis of your own practicum.

Submitting Assignments

- Assignments 2 and 3 (Part A) should be about 2000 words in length, word-processed and designed in such a way as to benefit your own understanding of the science teaching process. It should be intelligent and reflect your current thinking.
- Reference your work using the current APA style. Consult the APA style guide located on the Library website. All assignments must be word processed.
- Include both the Faculty of Human Sciences assignment coversheet (http://www.educ.mq.edu.au/undergraduate/current_students/assignment_coversheet/) signed and dated along with the assignment feedback sheet (located in the unit guide) for the corresponding assignment. Then, submit your assignment electronically through Turnitin in iLearn (https://ilearn.mq.edu.au/login/MQ/)
- Make sure you keep a copy of your assignment in case of loss.

Assessment Tasks

Name	Weighting	Due
Websites for science teaching	10%	9 March 2015
Reflexive practice	40%	11 May2015
Understanding of conceptions	50%	1 June 2015

Websites for science teaching

Due: **9 March 2015**
Weighting: **10%**

Assignment 1 Websites for science teaching 10%

Due: Monday 9 March 2015, 4.00pm

The aim of this assignment is for you to critique a science website for the specific purpose of science teaching. The assignment will assist you in the further selection of websites for science learning/teaching at a junior secondary school. Teachers often use the following websites either for Stage 4/5 or for a specific science in Stage 6. Suggested time for this assignment is 6 hours.

ABC Science	http://www.abc.net.au/science/
Australian Academy of Science	http://www.science.org.au/nova/
Australian Museum	http://australianmuseum.net.au
CSIRO	http://www.csiro.au/
Geoscience Australia	http://www.ga.gov.au
Learning Biology. Uni of Utah	http://learn.genetics.utah.edu/
NASA	http://www.nasa.gov/

Select one of the websites above and write a critique of no more than *500 words* addressing each of the following:

- Science content
- Relevance to the new Years 7-10 NSW Science Syllabus document
- Design and navigation through the site
- Presence, ease of use and suitability of animations, graphics, games etc.
- Other comments

On successful completion you will be able to:

- A working knowledge of the relevant syllabus science documents from both the BOSTES

(NSW) and National Curriculum (ACARA)

- The ability to interpret research findings both in science and science education and relate these where appropriate to adolescent's understandings in science, their lives and to current syllabus documents
- To think critically about their use of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage students with science
- A developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation

Reflexive practice

Due: **11 May2015**
Weighting: **40%**

Assignment 2 Reflexive Practice 40%

Due: Monday 11 May 2015 at 4.00pm

The aim of the assignment is to give you the opportunity to develop your own science teaching, in an area of specific interest. Through your personal reflections on your teaching experiences, you will already be familiar with areas of science teaching which are important and which you want to develop in your professional practice during TEP401. The assignment will help you develop the reflexive practice of action-on-reflection through research, self-evaluation skills and the use of classroom-based research. These will be of value in the future. In addition, you will be able to compare/contrast aspects of this work with guidance from your Supervising Teacher (ST).

You need to identify ONE area of science learning/teaching of interest to you during TEP401. You will achieve this by professional reading, teaching with and observing your ST and other science teachers, talking with students, trialling your ideas in the classroom after consultation with your ST, collecting evidence about what happens, discussing this with your ST and/or with students, analysing the data you have collected and writing up your findings and conclusions. Re-reading your personal reflections, lesson plans, ST feedback on these lessons and lesson observations notes will be good places to start.

Suggested time is 24 hours. This does not include the time spent at school because this is part of your TEP401 requirements.

Procedure

1. Select an area of science teaching/learning, which you want to develop, improve or learn more about. Consider your reasons WHY you want to investigate this further. (Do not select classroom management.)

2. The following are examples for your consideration. Consult with your ST.

- Strategies to enhance learning for all students in a mixed ability classroom or with a group of gifted and talented students or students from a non-English speaking background.
- Testing out ideas for formative assessment with Yr 7, 8, 9 or 10.
- The use of questioning to identify and develop students' thinking about science: a focus on Yr 7, 8, 9 or 10 using a recent scientific discovery/invention reported in the news.
- Exploring how to get Yr 9 and 10 students to evaluate their own learning with/without the use of laptops.
- The value of the interactive whiteboard (IWB) in teaching science or exploring learning strategies/activities for student use of the IWB.
- Use of analogies, animations, or models in science learning/teaching.

1. Read some of the relevant professional and research literature on your topic.
2. Work out a coherent plan of action. Think about the kind of evidence you will need to evaluate this plan e.g. the students' written work, an accurate record of what you say in class; an analysis of student responses during discussion; brief interviews with or a questionnaire to students about what they learned or what helped them to learn. Think about the criteria you will use to evaluate your plans.

Try out your plan in the classroom over the course of several lessons. Ask your Supervising Teacher to assist/advise you about the implementation of your planned strategy. This can be achieved by:

- You agreeing with your ST about what evidence should be collected and how this should be done.
- You teaching the lessons and your ST collecting evidence about what has happened. They might provide you with information, their views and judgments.
- Your Supervising Teacher providing you with the evidence collected after each lesson.
- You both discussing what took place and you yourself evaluating what you did.
- Making sure that you write up your reflection at each stage of the assignment. This will be useful to complete the final report.

Product: A report of your area of interest (2000 word limit) that pays attention to the following:

- The nature of the teaching aspect under investigation
- A critique of the relevant science education research literature.
- Discussion of your investigation plan and your research findings
- Impact of the area of interest on your current and future teaching practice.

References

Use the APA style in citing your references; examples of good style guides are available on the library website. Consult the Macquarie University library ERIC database for further research findings on your selected topic. Please note that a lack of references detracts from what might otherwise be an outstanding piece of research.

Ethical Considerations

Researching your own practice forms part of normal teacher's evidence-based decision making processes and as such does not require formal ethics approval from Macquarie University. However, you may be reporting on your Supervising Teacher's and your students' opinions and this requires you to follow the advice of your school about seeking permission to use these sources of information for your assignment. Generally you would be required to ask for written parental permission to conduct your research for your assignment: briefly describing your project, requirement of your students and guaranteeing student anonymity. This aspect of your assignment will be discussed in the tutorial.

On successful completion you will be able to:

- A knowledge of the changing policy context of secondary schooling in NSW (BOSTES, NSWDET) and Australia (ACARA) with specific reference to science
- The ability to plan and present sequential lessons based on evidence collected during the professional experience (TEP401)
- The ability to reflect on and critique one's own professional practice with due regard to the input provided by experienced science teacher(s)
- The ability to interpret research findings both in science and science education and relate these where appropriate to adolescent's understandings in science, their lives and to current syllabus documents

Understanding of conceptions

Due: **1 June 2015**
Weighting: **50%**

Assignment 3 ***Students' Understanding of a Concept*** ***50%***

Due: Monday 1 June 2015 at 4.00pm

The aim of this assignment is to provide you with a research-based understanding of students' views and beliefs about science concepts. It is an opportunity for you to 'listen to the kids' about their ideas of science, to relate this to the science education literature on children's science and from this to develop a lesson which contributes to developing your students' scientific understandings. Science education research indicates that a student's prior knowledge and understanding influences how they process new concepts in science and link these into a conceptual framework.

Suggested time is 30 hours. This does not include the time spent at school because this is part of your TEP401 requirements.

Part A (40%)

Procedure:

1. Consult with your ST to select a science concept or system from the Science Stage 4-5 Syllabus and school's science program, which you will teach during TEP401. This may include one of the following - force, friction, gravity, heat, electricity, solution, kinetic theory, respiration, photosynthesis, bacteria (or any other concept) or a system such as the digestive system, solar system (or any other system).
2. Gather data on students' understanding of concept or system. There are various ways in which you can probe the depth of student understanding. Consult children's science literature for other ways of collecting data and its analysis. A few ways to probe understanding include asking students to:

- discuss their ideas about a science concept/system.
- write and/or draw what they know about concept/system.
- answer a series of questions about concept/system.
- construct a mind map using their ideas related to concept/system.

1. Explore concept/system with a Year 7-10 class **before** you teach them the concept/system. This data will be useful when you come to prepare lessons in the future.
2. When you talk with students emphasise that you are interested in **their** ideas. The activity is **not** a test and their contribution is **valuable** for you in coming to understand where they might have difficulties with certain science topics. Always ask 'why' type questions to probe the level of their understanding. Comments such as "that is an interesting idea – can you talk with me more about that …" engage students in conversation.

Product:

Submit a report (2000 words) which clearly illuminates the concept/system you have chosen, the results of your research, along with evidence that you have consulted several of the references found in leading science education journals relating to general science conceptual understanding and your concept/system in particular. It is essential that you think clearly about the implications of your findings on your science teaching and indicate where this concept/system is addressed in the syllabus. Ensure that the assignment contains a detailed critique of your findings and not simply observation statements. The submission of examples of de-identified students' work is *encouraged*. This assignment may be written in report form using sub-headings.

Part B: Lesson Plan (10%)

The purpose of this section of the assignment is to demonstrate your understanding of the significance of the results and analysis you obtained about concept/system in Part A. Prepare a complete science lesson (40 mins) showing how you will assist students in their understanding of concept/system. For example, you might think about presenting experimental situations that challenge student thinking and/or where their predicted results do not align with what they observe. The lesson should engage students in a range of learning activities for the entire lesson. Ensure that you submit each of the following typed documents:

- Lesson plan pro forma completed
- Lesson notes including presentations, websites, equipment list, safety aspects etc
- Student worksheets – include those you would expect from a student with a correct scientific understanding about concept/system **and** one from a student who has one or more misconceptions. Examples of the latter can be obtained from Part A.
- Your critical comment and evaluation of both the proposed lesson and student learning – 300 words is sufficient. Please note that what your write here must be supported by Part A and the science education literature.

References:

Lack of references detracts from what might otherwise be an outstanding piece of research. Please follow the APA style as demonstrated in an appropriate APA style guide located on the Library website.

The books below are regarded as *classics*. However, consult the American Association for the Advancement of Science Literacy Maps (http://strandmaps.nsdl.org/) and the wider research literature on the current status of research studies.

Driver, R. (1983). *The pupil as scientist?* Milton Keynes: The Open University Press.

[Call No: Q181.D68]

Driver, R. (1985) *Children's' ideas in science*. Milton Keynes: The Open University Press. [Call No: Q181.A1.C49/1985]

Driver, R. et al (1994). *Making sense of secondary science*. London: Routledge.

[Call No: Q181.M1738/1994]

Driver, R. (1996). *Young people's images of science*. Bristol: Open University Press.

[Call No: Q181.D69/1996]

Fensham, P.J., & Gunstone, R. (1994). *The content of science: A constructivist approach to its teaching and learning.* London: Falmer Press. [Call No: Q181.F337/1994]

Gunstone, R.F. (1991). Reconstructing theory from practical experience. In B.E Woolnough, (Ed.), *Practical science*. Buckingham, Open University Press.

White, R.T. (1988). Learning science. Oxford: Blackwell. [Call No: Q181.W48/1988]

Woolnough, B.E. (1991) Practical science as a holistic activity. In B.E. Woolnough, (Ed.), *Practical science: The role and reality of practical work.* Milton Keynes: Open University Press. [Call No: Q181.P63/1991]

Ethical Considerations

Researching your own practice forms part of normal teacher's evidence-based decision making processes and as such does not require formal ethics approval from Macquarie University. However, you may be reporting on your Supervising Teacher's and your students' opinions and this requires you to follow the advice of your school about seeking permission to use these sources of information for your assignment. Generally you would be required to ask for written parental permission to conduct your research for your assignment: briefly describing your project, requirement of your students and guaranteeing student anonymity. This aspect of your assignment will be discussed in the tutorial.

On successful completion you will be able to:

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- A working knowledge of the relevant syllabus science documents from both the BOSTES (NSW) and National Curriculum (ACARA)
- The ability to interpret research findings both in science and science education and relate these where appropriate to adolescent's understandings in science, their lives and to current syllabus documents
- A developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation

Delivery and Resources

TEP Science Laboratory E7B317 – location of all classes

The Science Curriculum Laboratory is available for student use throughout the year. At times the laboratory is closed so that workshops can be prepared. Students are asked not to disturb the laboratory staff at these times. There will be some variation in opening times during the semester - students are asked to double check on these times. Please email ahead of time.

In the interests of safety and security, students are asked to inform the laboratory assistant when entering and leaving the area. You are required to wear appropriate shoes and safety glasses at all times when conducting experimental work. Doors **must** be left **locked**. *Note*: Students are **NOT** permitted in the Preparation Area adjacent to the Lab; Children are **NOT** permitted in the Laboratory **OR** in the Preparation Room.

Library Information

Level 1 of Macquarie University Library has a large and diverse selection of resources for the teaching of Science (ranging from posters, books and CD ROM). It is suggested that students use this centre when looking for resources to plan lessons.

The University library website is located at http://www.lib.mq.edu.au

Attendance

TEP433 is a professional, workshop-based unit of study. Students are therefore required to satisfy the attendance requirements specified by the School of Education. Where the student fails to meet this requirement they may be asked to show cause why they should not be excluded from, or fail the unit. Where a student thinks their attendance may fall below requirements they should be prepared to substantiate their reasons by supplying the relevant documentation (for example, a doctor's certificate). Students should also consider lodging a 'Special Consideration' application through the University's Student Office.

Special Consideration

The University is committed to equity and fairness in all aspects of its learning and teaching. In stating this commitment, the University recognises that there may be circumstances where a student is prevented by unavoidable disruption from performing in accordance with their ability.

The Special Consideration provision is to support students who experience serious and unavoidable disruption such that they do not reach their usual demonstrated performance level.

The University recognises that at times an event or set of circumstances may occur that:

- could not have reasonably been anticipated, avoided or guarded against by the student;
- was beyond the student's control;
- caused substantial disruption to the student's capacity for effective study and/or completion of required work;
- substantially interfered with the otherwise satisfactory fulfilment of unit or program requirements; and
- was of at least three (3) consecutive days' duration within a study period, and/or prevented completion of a formal examination.

Information related to Special Consideration can be found at: ask.mq.edu.au

The Special Consideration policy can be found at: Policy Central www.mq.edu.au/policy/index.html

Technology Requirements

Students enrolled in TEP433 will need regular access to a computer and the Internet. There are a number of university computers in the library and in C5C (Rooms 211, 213 and 217). Computers in Room C5A210 can be accessed at specified times.

The iLearn web page for this unit can be found at https://ilearn.mq.edu.au/login/MQ/

Students will need to use their own student username and password to log in and then choose TEP433 from their My Online Units menu.

The TEP433 iLearn facility provides students with access to:

- All weekly workshops
- A soft copy of the TEP433 Unit Outline, assignment cover sheets and marking criteria
- Selected policy documents

Need help with iLearn? Contact the Macquarie University Library Student IT Help Desk (Phone: 9850 4357; Email: support@mq.edu.au)

***TEP433 has two main components**:*

Mini-lectures that focus on specific issues related to science learning and teaching in school (e.g. Language/literacy of science, purpose of practical work), how students conceptualise science concepts, programming, and assessment.

Lab and ICT based activities that integrate the mini-lectures with practical/ICT opportunities available to high school students in schools. You will trial and assess the suitability of suggested activities in each workshop.

Relationship with TEP 434 Science in the Secondary School 11

TEP434 focuses on the teaching of specialist science and further develops some of the themes from TEP433. Two specialist science workshops must be done to fulfill the requirements of TEP434 – biology, chemistry, earth and environmental science and physics. The choice is dependent upon your previous academic science studies.

Relationship of TEP401: Professional Experience in Secondary School 1

The work done in TEP433 complements and supports your work in school with your Supervising Teacher (ST). These experienced classroom teachers provide professional advice and report to the School of Education about your developing expertise as a science teacher. University supervising lecturers will visit you at school once per semester, observe you in the classroom, consult with your ST and speak with you both during the visit.

Professional experience is an essential component of the Bachelor of Education (Science). Close links with TEP401: Professional Experience in Secondary School 1 will be established and maintained by:

- visits to your school by supervising lecturers;
- relating workshop topics to your present school situation;
- providing guidance in workshops on the planning and implementation of lesson plans, teaching sequences and units of work for you to teach in your school;
- inviting visiting lecturers with expertise in related Science Education areas to address areas of specific interest;

- acquainting Supervising Teachers with the philosophy, content and teaching methods of TEP433 Science in the Secondary School I.

Visits to schools will begin in March with one initial visit in Semester 1. You will be informed as to who will be coming. The best time of the day is in the morning up until lunchtime. Ideally, two contrasting lessons need to be prepared for assessment. Where possible lessons should follow each other or be separated by recess. Please ensure that you have addressed each of the following.

- Notified your Supervising Teacher and Head Teacher Science of the visit – some schools require that the Principal be informed.
- Inform the staff at the front office of the school of the visit and be there at the arranged time.
- Provide the visiting lecturer with a photocopy of your lesson plans including completed student worksheets, lesson notes etc. These should be typed. Lesson plans including Supervising Teacher comments and suggestions should be sought beforehand and included as photocopies for the visiting lecturer.
- Lesson plans should be of high quality in preparation, planning and implementation. They should be such that you can take them along to an interview as evidence of your professional development.
- Arrange a time for feedback after the lessons with both your Supervising Teacher and the visiting lecturer.

Satisfactory completion of TEP401

Satisfactory progress means that a student is showing progress that suggests they will develop the attributes of a Graduate Teacher by the end of the year. Supervising Teachers will be asked to provide a report on student progress towards the end of TEP401. If the progress is not satisfactory students may be requested to withdraw from all Semester I methodology and professional experience units.

Some students experience initial difficulties in schools. It is vital that they realise that many others have progressed to a fully competent teacher from a slow start. All students have ready access to curriculum lecturers through office visits, telephone calls, and email. These are in addition to the normal weekly curriculum workshops. Students are strongly urged to seek support from both their Supervising Teacher and curriculum lecturer. They are also advised to reflect carefully upon observations, unit reference lists, materials in the Curriculum Resources Centre and draw upon the experiences of their TEP colleagues.

Academic staff work closely with Supervising Teachers in monitoring student progress. Where progress is delayed for any reason the Supervising Teacher informs the university of his/her concerns. Depending on the circumstances the student may be deemed to be ‘at risk’. If this occurs the student will be notified in writing.

‘At risk’ students may be provided with a remedial program. Such a program might include:

- Additional supervisory visits by academic staff
- More detailed oral and written feedback from Supervising Teachers and academic staff
- The identification of specific areas needing improvement
- Additional days of school experience
- Referral to university-based support services

If reasonable progress has not been observed, the School of Education reserves the right to place the student at a different school. In cases where inadequate progress is reported in two placements, the student will be deemed to have failed the Professional Experience unit.

Where students have concerns about the level of support provided by their Supervising Teacher they must discuss the issue with the curriculum lecturer as soon as possible. Students cannot make a unilateral decision to cease attending the school in which they are placed. Such a move will result in failure of the Professional Experience unit. Students may ask to be moved to another school, but the final decision is made by the Director of the Teacher Education Program or his/her nominee. Students must not assume that their requests will be granted.

If a student fails a practicum unit twice she/he will be excluded from all Teacher Education programs offered by the Bachelor Degree Rule 14(2). The determination of successful completion of a Professional Experience unit is the responsibility of the School of Education staff (academic supervisor) in consultation with the relevant Supervising Teacher.

It is important that students familiarise themselves with the information contained in the TEP Professional Experience Guide.

Required Texts

Students must have access to the following syllabus document:

Board of Studies Teaching & Educational Standards. (2013). Science K-10 Syllabus. Sydney: BOSTES. http://syllabus.bos.nsw.edu.au/science/

Recommended Texts

Alsop. S. & Hicks, K. (2001). Teaching science – A handbook for primary and secondary teachers. London: Kogan Page.

Arthur-Kelly, M., Lyons, G., Butterfield, N.D., & Gordon, C. (2006). Classroom management. Melbourne: Thomson.

Bell, R. L., Gess-Newsome, J., & Luft, J. (2008). Technology in the secondary science classroom. Arlington: NSTA Press.

Bybee, R. Powell, J., & Trowbridge, L. (2008). Teaching secondary school science. Strategies for developing scientific literacy. Upper Saddle River: Merrill Prentice Hall.

Chiappetta, E., & Koballa, T. (2010). Science instruction in the middle and secondary schools. Upper Saddle River: Merrill Prentice Hall.

Harrison, A., & Coll, R. (Eds.) (2008). Using analogies in middle and secondary science classrooms. Thousand Oaks: Corwin Press.

Hassard, J., & Dias, M. (2009). The art of teaching science: Inquiry and innovation in middle school and high school. New York: Routledge.

Liversidge, T., Cochrane, M. Kerfoot, B., & Thomas, J. (2009). Teaching science: Developing as a reflective secondary teacher. London: SAGE.

Monk, M., & Osborne, J. (2000). Good practice in science teaching - what research has to say. Buckingham: Open University Press.

Mortimer, E, F., & Scott, P. (2003). Meaning making in secondary science classrooms. Maidenhead: Open University Press.

Ratcliffe, M., & Grace, M. (2003). Science education for citizenship: Teaching socio-scientific issues. Maidenhead: Open University Press.

Skamp, K. (Ed.) (2012). Teaching primary science constructively (4th ed.). Melbourne: Thomson.

Venville, G., & Dawson, V. (2004). The art of teaching science. Sydney: Allen & Unwin.

Venville, G., & Dawson, V. (Eds.). (2012). The art of teaching science: For middle and secondary school. Sydney: Allen & Unwin.

Wellington, J. (2006). Secondary education the key concepts. London: Routledge.

Wellington, J., & Osborne, J. (2001). Language and literacy in science education. Buckingham: Open University Press.

Xiufeng Lui. (2010). Essentials of science classroom assessment. London : SAGE.

Science education journals in Macquarie University library

Please note: Many of these journals are available electronically from the library.

Teaching Science (The journal of the Australian Science Teachers Association)

International Journal of Science Education

Journal of Biology Education

Journal of Chemical Education

Journal of Research in Science Education

Research in Science Education

School Science and Mathematics

School Science Review

Science Education

Studies in Science Education

Keywords which might assist in your ERIC search

Science activities, curriculum, instruction programs, experiments, biology, physics, chemistry, environmental studies/science, geology, real science, authentic science

Secondary School high school, elementary, secondary, ESL, Indigenous

Teachers science teachers, beginning teachers, student teachers, mentors, exemplary teachers

Teaching Methods quality teaching, diagnostic teaching, multi-media, technology, gender, group work, concept maps, computer, Internet, ICT

Learning Strategies children's science, alternative frameworks, conceptual change, misconceptions, constructivism, ESL, ICT, problem solving, controversial issues, discovery learning, group work, individual instruction.

Relevant websites

Australian Curriculum, Assessment, and Reporting Authority: [http://www.acara.edu.au]

Australian Institute for Teaching and School Leadership: [http://www.aitsl.edu.au]

Board of Studies, Teaching & Educational Standards: [http://www.boardofstudies.nsw.edu.au]

NSW Department of Education and Communities: [http://www.dec.nsw.edu.au]

NSW Teachers Federation: [http://www.nswtf.org.au/future_teachers/]

NSW Independent Education Union: [http://www.ieu.asn.au/]

NSW Association of Independent Schools: [http://www.aisnsw.edu.au/Main/]

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

When using the University's IT, you must adhere to the Acceptable Use Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcome

- The ability to plan and present sequential lessons based on evidence collected during the professional experience (TEP401)

Assessment task

- Reflexive practice

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- The ability to plan and present sequential lessons based on evidence collected during the professional experience (TEP401)
- The ability to reflect on and critique one's own professional practice with due regard to the input provided by experienced science teacher(s)
- A working knowledge of the relevant syllabus science documents from both the BOSTES (NSW) and National Curriculum (ACARA)
- The ability to interpret research findings both in science and science education and relate these where appropriate to adolescent's understandings in science, their lives and to current syllabus documents
- To think critically about their use of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage students with science

Assessment tasks

- Websites for science teaching
- Understanding of conceptions

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary

solutions to problems.

This graduate capability is supported by:

Learning outcomes

- A knowledge of the changing policy context of secondary schooling in NSW (BOSTES, NSWDET) and Australia (ACARA) with specific reference to science
- The ability to plan and present sequential lessons based on evidence collected during the professional experience (TEP401)
- A developing knowledge of both formal and informal assessment procedures in current use in secondary science classrooms
- The ability to reflect on and critique one's own professional practice with due regard to the input provided by experienced science teacher(s)
- A working knowledge of the relevant syllabus science documents from both the BOSTES (NSW) and National Curriculum (ACARA)
- The ability to interpret research findings both in science and science education and relate these where appropriate to adolescent's understandings in science, their lives and to current syllabus documents
- To think critically about their use of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage students with science
- A developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation

Assessment tasks

- Websites for science teaching
- Reflexive practice
- Understanding of conceptions

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- A knowledge of the changing policy context of secondary schooling in NSW (BOSTES, NSWDET) and Australia (ACARA) with specific reference to science
- The ability to plan and present sequential lessons based on evidence collected during the professional experience (TEP401)
- A developing knowledge of both formal and informal assessment procedures in current use in secondary science classrooms
- The ability to reflect on and critique one's own professional practice with due regard to the input provided by experienced science teacher(s)
- A working knowledge of the relevant syllabus science documents from both the BOSTES (NSW) and National Curriculum (ACARA)
- The ability to interpret research findings both in science and science education and relate these where appropriate to adolescent's understandings in science, their lives and to current syllabus documents
- To think critically about their use of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage students with science
- A developing understanding of key elements of pedagogy including: the strategies needed to cater for the diversity of learners (including specific equity groups), actively engaging students in learning, classroom management, beginning and ending lessons, integrating a focus on literacy, developing and selecting resources, questioning, and assessment and evaluation

Assessment tasks

- Reflexive practice
- Understanding of conceptions

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- A knowledge of the changing policy context of secondary schooling in NSW (BOSTES, NSWDET) and Australia (ACARA) with specific reference to science

- The ability to plan and present sequential lessons based on evidence collected during the professional experience (TEP401)
- The ability to interpret research findings both in science and science education and relate these where appropriate to adolescent's understandings in science, their lives and to current syllabus documents
- To think critically about their use of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage students with science

Assessment tasks

- Reflexive practice
- Understanding of conceptions

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- The ability to plan and present sequential lessons based on evidence collected during the professional experience (TEP401)
- The ability to reflect on and critique one's own professional practice with due regard to the input provided by experienced science teacher(s)
- To think critically about their use of information and communication technologies (ICT) to enhance the quality of learning and teaching to engage students with science

Assessment tasks

- Websites for science teaching
- Reflexive practice