



**UNSW**  
SYDNEY

**Arts & Social Sciences**

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School of Education

EDST5303

Learning, Problem Solving, and the  
Development of Expertise

Semester 2, 2017

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### IMPORTANT:

For student policies and procedures relating to assessment, attendance and student support, please see website, <https://education.arts.unsw.edu.au/students/courses/course-outlines/>

**The School of Education acknowledges the Bedegal and Gadigal people as the traditional custodians of the lands upon which we learn and teach.**

## 1. LOCATION

Faculty of Arts and Social Sciences

School of Education

EDST5303 Learning, problem solving, and the development of expertise (6 units of credit)

Semester 2, 2017

## 2. STAFF CONTACT DETAILS

Course Coordinator: Professor Slava Kalyuga  
Office Location: Goodsell Building 105  
Email: [s.kalyuga@unsw.edu.au](mailto:s.kalyuga@unsw.edu.au)  
Phone: 9385 1985  
Availability: Wed 16-17 or by appointment

## 3. COURSE DETAILS

<b>Course Name</b>	EDST5303 Learning, problem solving, and the development of expertise	
<b>Credit Points</b>	6 units of credit (uoc)	
<b>Workload</b>	Includes 150 hours including class contact hours, readings, class preparation, assessment, follow up activities, etc.	
<b>Schedule</b>	Wednesday 17:00-19:00 Colombo LG02	Weeks 1-9, 10-12

### **Summary of Course**

The major focus of this course is to examine how the cognitive structures are organised into a coherent architecture enabling humans to learn, think, reason and solve problems. The central role played by active learning in this architecture is emphasised. The course examines how expertise develops and how teaching strategies should be matched to individual needs to promote knowledge acquisition. An introduction to cognitive load theory is made, and a number of applications for the classroom and other educational environments are discussed.

### **Student Learning Outcomes**

Outcome		Assessment/s
1	Understand the concept of information processing	1,2,3
2	Understand the structure and workings of human memory Understand how knowledge is constructed and its relation with memory	1,2,3
3	Understand how expertise develops and differences between experts and novices	1,2,3
4	Understand the evolutionary basis for knowledge	2,3
5	Gain knowledge of the higher cognitive processes	2,3
6	Gain some knowledge of the implications of human cognitive architecture for teaching and instructional design.	1,2,3

### **Program Learning Outcomes**

Standard		Assessment/s
1	<b>Advanced disciplinary knowledge and practices</b> Demonstrate an advanced understanding of the field of education as it relates to their specialist area of study, and the ability to synthesize and apply disciplinary principles and practices to new or complex environments.	1,2,3
2	<b>Enquiry-based learning</b> Demonstrate an in-depth understanding of research-based learning and the ability to plan, analyse, present implement and evaluate complex activities that contribute to advanced professional practice and/or intellectual scholarship in education.	1,2,3
3	<b>Cognitive skills and critical thinking</b> Demonstrate advanced critical thinking and problem solving skills	1,2,3
4	<b>Communication, adaptive and interactional skills</b> Communicate effectively to a range of audiences, and be capable of independent and collaborative enquiry and team-based leadership	2
5	<b>Global outlook</b> Demonstrate an understanding of international perspectives relevant to the educational field	1,2,3
6	<b>Ethics</b> Demonstrate an advanced capacity to recognise and negotiate the complex and often contested values and ethical practices that underlie education	3

### **AITSL Professional Teaching Standards (Proficient, Highly Accomplished, Lead)**

Standard		Assessment/s
1.1.2	Use teaching strategies based on knowledge of students' physical, social and intellectual development and characteristics to improve student learning.	2,3
1.2.3	Expand understanding of how students learn using research and workplace knowledge.	3
1.5.2	Develop teaching activities that incorporate differentiated strategies to meet the specific learning needs of students across the full range of abilities.	1,3

#### **4. RATIONALE FOR THE INCLUSION OF CONTENT AND TEACHING APPROACH**

EDST5303 places a large emphasis on the role played by memory processes in effective learning and instruction. The teaching in this course is based on an active learning philosophy.

#### **5. TEACHING STRATEGIES**

Student-centered activities will form the basis of the course, which will draw on the prior knowledge of the students and allow engagement in relevant and challenging experiences. The lectures are designed to be supportive and friendly, and include meaningful realistic learning tasks, as well as promote independent and collaborative study, and enquiry.

Teaching strategies used during the course will include:

- small group learning to understand the importance of teamwork in an educational context and to demonstrate the use of group structures as appropriate to address teaching and learning goals;
- explicit teaching including lectures and a range of teaching strategies to foster interest and support learning;
- structured occasions for reflection on learning to allow students to reflect critically on issues discussed;
- extensive opportunities for whole group and small group dialogue and discussion, allowing students the opportunity to demonstrate their capacity to communicate

These activities will occur in a climate that is supportive and inclusive of all learners.

## 6. COURSE CONTENT AND STRUCTURE

Week/ Lecture	Date	Lecture Topic
1	26/7	Introduction to the course. Information processing approach to human cognition. Human cognitive architecture.
2	2/8	Working memory
3	9/8	Long-term memory. The role of schema construction and automation in the development of expertise
4	16/8	The role of knowledge and expertise in problem solving performance
5	23/8	The evolutionary perspective on human cognitive architecture and its consequences for learning and instruction
Break due to the lecturer's attendance of overseas conferences/meetings (the course will be extended to 25 october)		
6	13/9	Introduction to cognitive load theory. Instructional alternatives to problem solving
7	20/9	Instructional approaches to managing learner cognitive load
University break week		
8	4/10	Learning from multimedia and animations (e-learning)
9	11/10	Expertise reversal effect. Tailoring learning tasks to learner cognitive characteristics and goals
10	18/10	Recent development and future directions.
11	25/10 5-7 pm	11. <b>Student presentations</b>
12	25/10 7-9 pm	12. <b>Student presentations</b>

## 7. RESOURCES

### **Required Readings**

**Textbook details:** There are no set textbooks for this course, although the following will be frequently referred to:

Clark, R. Nguyen, F., & Sweller, J. (2006). *Efficiency in Learning*, San Francisco: John Wiley & Sons, Inc.

Mayer, R. E. (2008). *Learning and Instruction, 2<sup>nd</sup> edition*. New Jersey: Pearson

Sweller, J., Ayres, P. & Kalyuga, S. (2011). *Cognitive load theory*. New York: Springer.

## Further Readings

Specific research articles are recommended for different lectures. Copies of the articles are provided on Moodle

## 8. ASSESSMENT

Assessment Task	Length	Weight	Student Learning Outcomes Assessed	Program Learning Outcomes Assessed	Due Date
Task 1 MC Test on human cognitive architecture	20 min	20%	1-3, 6	1-5	Week 5 (Wed 23/8)
Task 2 Tutorial Presentation	a) 15 minute presentation b) Concise summary (300 words)	30%	1-6	5-8	Weeks 11-12 (25 October)
Task 3 Major Essay	2500 words	50%	1-6	1-8	End of the course (Friday 3/11 5pm)

*Students are required to follow their lecturer's instructions when submitting their work for assessment. All assessment will be submitted online via Moodle by 5pm. Student no longer need to use a cover sheet. Students are also required to keep all drafts, original data and other evidence of the authenticity of the work for at least one year after examination. If an assessment is mislaid the student is responsible for providing a further copy. Please see the Student Policies and Procedures for information regarding submission, extensions, special consideration, late penalties and hurdle requirements etc.*

Task 1: MC Test on human cognitive architecture (20 min). In-class multiple-choice test (20 items) on major components and processes of human cognitive architecture (material of Lectures 1-3).

Task 2: Seminar presentations Make a 15-minute presentation on an application of the theory covered in this course using a short teaching episode of a topic (chosen by the student).

*A concise summary of the presentation should be provided (max 300 words)*

Task 3: Major Essay Complete a 2500-word essay based on the material covered in the course focusing on its application to specific individual teaching areas. The essay should consist of **an in-depth discussion of the theoretical and applied issues associated with a selected topic**. Possible essay topics will be discussed further in lectures.

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 FEEDBACK SHEET  
 EDST5303 LEARNING, PROBLEM SOLVING, AND THE DEVELOPMENT OF EXPERTISE

Student Name:  
 Assessment Task: Tutorial Presentation

Student No.:

SPECIFIC CRITERIA	(-) $\longrightarrow$ (+)				
Understanding of the question or issue and the key concepts involved					
Depth of analysis and/or relevance of specific examples					
Familiarity with and relevance of literature used to prepare presentation					
Structure and organisation of presentation					
Quality of presentation (use of media, interaction with audience, etc.)					
<b>GENERAL COMMENTS/RECOMMENDATIONS FOR NEXT TIME</b>					

**Lecturer**  
**Recommended:** /20 (FL PS CR DN HD)

**Date**  
**Weighting:** 30%

NB: The ticks in the various boxes are designed to provide feedback to students; they are not given equal weight in determining the recommended grade. Depending on the nature of the assessment task, lecturers may also contextualize and/or amend these specific criteria. **The recommended grade is tentative only, subject to standardisation processes and approval by the School of Education Learning and Teaching Committee.**



UNSW SCHOOL OF EDUCATION  
 FEEDBACK SHEET  
 EDST5303 LEARNING, PROBLEM SOLVING, AND THE DEVELOPMENT OF EXPERTISE

Student Name:  
 Assessment Task: Major Essay

Student No.:

SPECIFIC CRITERIA	(-) $\longleftarrow$ $\longrightarrow$ (+)				
<b>Understanding of the question or issue and the key concepts involved</b> <ul style="list-style-type: none"> <li>• understanding of the topic and its relationship to relevant areas of the course</li> <li>• clarity and accuracy in use of key terms and concepts</li> <li>• suitability of the topic</li> </ul>					
<b>Depth of analysis and critique in response to the task</b> <ul style="list-style-type: none"> <li>• depth of analysis</li> <li>• depth of critique of the issue</li> <li>• depth of implications/recommendations for improvement of learning and instruction</li> </ul>					
<b>Familiarity with and relevance of professional and/or research literature used to support response</b> <ul style="list-style-type: none"> <li>• effectiveness of examples to demonstrate instructional implications</li> <li>• variety of implications demonstrated</li> <li>• range of relevant research literature to support response</li> </ul>					
<b>Structure and organisation of response</b> <ul style="list-style-type: none"> <li>• Level of structure and organisation of response</li> </ul>					
<b>Presentation of response according to appropriate academic and linguistic conventions</b> <ul style="list-style-type: none"> <li>• clarity, consistency and appropriateness of conventions for quoting, paraphrasing, attributing sources of information, and listing references</li> <li>• appropriateness of overall structure and coherence of response</li> <li>• clarity and consistency in presenting tables and figures</li> <li>• clarity and appropriateness of sentence structure, vocabulary use, spelling, punctuation and word length</li> </ul>					
<b>GENERAL COMMENTS/RECOMMENDATIONS FOR NEXT TIME</b>					

**Lecturer** \_\_\_\_\_ **Date** \_\_\_\_\_  
**Recommended:**     /20     (FL PS CR DN HD)     **Weighting:**             50%

NB: The ticks in the various boxes are designed to provide feedback to students; they are not given equal weight in determining the recommended grade. Depending on the nature of the assessment task, lecturers may also contextualize and/or amend these specific criteria. **The recommended grade is tentative only, subject to standardisation processes and approval by the School of Education Learning and Teaching Committee.**