



Centre for eLearning Innovations and
Partnerships in Science and Engineering
(eLIPSE)

School of Mechanical and Mining Engineering

ANNUAL REPORT

2016

Supporting discipline experts to lead eLearning innovation

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About eLIPSE

INTRODUCTION

The Centre for eLearning Innovations and Partnerships in Science and Engineering (eLIPSE) entered its second year with work commissioned on a large number of projects. Additional developers were employed to complete the project workload and 3 student developers enhanced the mix of the development team for the entire year.

In July 2016, the Centre made application to the Vice-Chancellor and the Executive Deans of the Faculties of Engineering, Architecture and Information Technology (EAIT) and of Science for Vice Chancellor's Strategic Initiatives funding for the period 2017-2021. In December, the Centre was advised that the funding would not be provided from the Strategic Initiatives Fund, but rather should be sourced from additional funds distributed to faculties for the purpose of the University of Queensland (UQ) Student Strategy. The Executive Dean, EAIT, agreed to increase the Faculty's commitment to the proposal, thereby assuring the future of the Centre for 2017-2018.

RELEVANCE TO UQ STRATEGIC AIMS

In July 2016, UQ announced the roll-out of its 5-year Student Strategy, designed to provide students with the best opportunities and practical experiences during their time at university, empowering them to create change with a skill set that will prepare them to exceed expectations throughout their careers.

The Centre's application for funding emphasised the importance to the Student Strategy of sustainable outcomes for projects funded under UQ teaching and learning initiatives and the need to maintain and prepare tools developed under these schemes for corporate implementation. Emphasis was also placed on demonstrating improved learning outcomes and student engagement resulting from eLIPSE projects through the derivation and application of metrics.

In preparing the application, the Centre identified goals and initiatives in the Student Strategy which aligned with the work already being undertaken in the Centre, and where a direct future impact could be predicted. These are set out in the following table.

About eLIPSE

UQ Student Strategy Goals/ Initiatives	eLIPSE Contribution
Goal 2: Student-centred flexibility	
Goal 2 – Initiative 1 Extend online and on-campus active learning	The EAIT “Flipping the classroom” work, led by eLIPSE’s Associate Professors Carl Reidsema and Lydia Kavanagh, is already highlighted in the White Paper as contributing to this initiative. Such “classroom flipping” is not possible without the tools which help students engage with the content outside class time. Tools such as the Learning Pathway, Semant and MOOCchat are critical here.
Goal 2 – Initiative 4 Learning analytics & eAssessment capability	Providing feedback to students on their learning is key to a number of eLIPSE projects. The Learning Pathway Stage 2 will provide students with a personalised dashboard within Blackboard which lets them know how they are progressing in their learning. Semant has been created as a tool to quickly mark student work (e.g. their responses to pre-learning activities) and determine common issues/themes in student responses using semantic analysis.
Goal 3: Dynamic people & partnerships	
Goal 3 – Initiative 3 Teaching innovation support	eLIPSE works closely with Faculty based eLearning designers to disseminate technologies and tools. However, once project funding runs out, ongoing support for wider uptake becomes difficult. eLIPSE is developing approaches that enable academic staff to provide learning environments that are currently beyond their expertise, and is committed to disseminating best practice initiatives.
Goal 3 – Initiative 1 Students as partners	eLIPSE employs students as interns to help create our eLearning tools. Not only does this provide work integrated learning opportunities for our students but it also ensures the student perspective is brought to the creation of our tools – resulting in better outcomes.
Goal 4: An integrated learning environment	
Goal 4 – Initiative 5 Student support interfaces	Through the Help! project, eLIPSE is developing student self-help tools that allow connections with academics when necessary.

GOVERNANCE

eLIPSE Advisory Panel

The Centre's directions and progress are advised on and evaluated by the eLIPSE Advisory Panel.

In 2016, the Panel comprised the Associate Deans (Academic) for the Faculties of EAIT and Science, the eLIPSE directors, a representative of the Science academics, representatives of the Institute for Teaching and Learning Innovation (ITaLI) and ITS Information Technology Services, and an expert on learning and teaching in higher education from the School of Education.

The Panel met twice in 2016, on 21 April and 28 November. Membership of the Advisory Panel in 2016 was:

Director, eLIPSE Centre (Chair)	Associate Professor Carl Reidsema, Faculty of EAIT/School of Mechanical and Mining Engineering
Program Director, Research Excellence, eLIPSE	Associate Professor Lydia Kavanagh, Faculty of EAIT
Program Director, Technology, Tools and Learning Analytics, eLIPSE	Associate Professor Peter Sutton, Faculty of EAIT/School of ITEE
Associate Dean (Academic), Faculty of EAIT	Associate Professor Peter Sutton, Faculty of EAIT/School of ITEE
Associate Dean (Academic), Faculty of Science	Professor Peter Adams, Faculty of Science
Science academic	Associate Professor Gwen Lawrie, School of Chemistry and Molecular Biosciences
Higher Education expert	Associate Professor Gloria Dall'Alba, School of Education
Representative, ITaLI	Professor Doune Macdonald, Pro-Vice-Chancellor, Teaching and Learning
Representative, ITS	Mr Rob Moffatt AM, Director, Information Technology Services

About eLIPSE

As required by the Advisory Panel, reports on eLIPSE activities were submitted to the Teaching and Learning Committees of the Faculty of EAIT (4 February and 23 September 2016) and the Faculty of Science (9 March and 7 December 2016).

eLIPSE Leadership Team

In 2016, the eLIPSE Leadership Team, which oversees the operations of the Centre and discusses strategy, was augmented by the addition of the newly-designated Software Development Manager of the Centre.

In the second half of the year, the newly-appointed Project Manager TEL Grants in ITaLI, Ms Jane Boulton, was invited to attend meetings as an observer, providing a link between the Centre and ITaLI which has been beneficial to both units.

In 2016, the Leadership Team met 30 times throughout the year. Membership of the Leadership Team in 2016 was:

Director, eLIPSE Centre (Chair)	Associate Professor Carl Reidsema, Faculty of EAIT/School of Mechanical and Mining Engineering
Program Director, Research Excellence, eLIPSE	Associate Professor Lydia Kavanagh, Faculty of EAIT
Program Director, Technology, Tools and Learning Analytics, eLIPSE	Associate Professor Peter Sutton, Faculty of EAIT/School of ITEE
Program Director, Partnerships	Professor Peter Adams, Faculty of Science
Education Designer (eLearning)	Ms Esther Fink, Faculty of EAIT
Software Development Manager	Mr Phil Waller, eLIPSE

The Centre is a school-level centre in the School of Mechanical and Mining Engineering. The Centre Director reports to the head of that School.

Achievements 2016

The Centre staged a major showcase of tools in the pilot stage, on 22 March 2016. It was attended by approximately 75 staff from across UQ, plus 5 members of the Queensland University of Technology (QUT) eLearning Technology Support group. The showcase was videoed by the UQ School of Communication and Arts so that the Resources sections of newly-developed project pages on the eLIPSE website could be enhanced with videos explaining the tools presented.

In 2016, ITaLI appointed Dr Hassan Khosravi to the position of Senior Lecturer in Learning Analytics. eLIPSE has been contributing 0.6 FTE in developer resources to assist him with data extraction, data processing and data visualisation in support of collaborative dashboard development.

On 29 November 2016, at the ASCILITE Conference in Adelaide, eLIPSE received the ASCILITE 2016 Award for Excellence in Learning Analytics. The successful submission was titled, *Supporting students' ownership of their learning with analytics* and can be viewed at:

<http://www.elipse.uq.edu.au/supporting-student-ownership-of-learning-with-analytics>

PROJECTS OVERVIEW

The projects formally completed by eLIPSE developers during 2016 were Help!, Semant and MOOCchat. The Learning Pathway Dashboard (Stage 2) was successfully piloted with ENGG1200 students in Semester 2.

More details on these achievements are provided in the section, Achievements against Agreed KPIs - Academic Development on page 13.

The following table provides an overview of the 2016 projects on which staff worked. The status code for each project is given in brackets and explained below the table.

Achievements 2016

Projects	Tool Type	Lead CI	Description
tJM: the JourneyMaker (Status: 3)	Curriculum mapping	Ian Cameron (Chemical Engineering)	<i>(Web-based version under development)</i> Curriculum design and visualisation tool to describe development of knowledge, skills, and personal attributes.
Learning Pathway (Stage 1) (Status: 5)	Course content scaffolding	Carl Reidsema (EAIT/Mechanical & Mining Engineering)	A navigational interface in Blackboard course sites that provides students with a clear visual roadmap of the course.
Learning Pathway (Stage 2) (Status: 3)	Bench-marking	Carl Reidsema (EAIT/Mechanical & Mining Engineering)	<i>(Under development)</i> Individually tailored dashboard representations of learning and achievement for students.
SmartAss (Status: 5)	Assessment	Michael Jennings (Mathematics & Physics)	An open-access online question and worked solution generator that covers a wide range of fundamental mathematical, statistical and quantitative content.
GetSet (Status: 5)	Assessment	Lydia Kavanagh (EAIT), Liza O'Moore (Civil Engineering) Michael Jennings (Mathematics & Physics)	A customisable system used to allow commencing students to self-test their readiness to study their chosen courses.
Semant (Status: 5)	Assessment/ Feedback	Michael Drinkwater (Mathematics & Physics)	A tool to perform semantic analysis on short answer Blackboard quiz questions to rapidly identify concepts students commonly struggle with.
Molecular structure simulation (Status: 5)	Visual simulation	Gwen Lawrie (Chemistry & Molecular Biosciences)	An open-source interactive, research-based simulation to help students engage in STEM through inquiry. Part of the University of Colorado PhET project.

Achievements 2016

Projects	Tool Type	Lead CI	Description
MOOCchat (Status: 4)	Peer learning	Carl Reidsema (EAIT/Mechanical & Mining Engineering)	<i>(Under development)</i> A tool that supports peer learning around challenging problems or concepts. A collaborative initiative with UC Berkeley.
Help! (Status: 5)	Self help	Lydia Kavanagh (EAIT)	A scalable, systematic approach to self-help and communication embedded in Blackboard.
ASD - Autism Spectrum Disorders (Status: 5)	Academic support	Lydia Kavanagh (EAIT)	Students with Asperger Syndrome in EAIT Faculty: A framework for supportive management and better educational outcomes.

Project Status Codes: 1. Scope/Specification 2. Prototype (development) 3. Prototype (refine) 4. Document/ Disseminate 5. Implement/Research/Modify

ACHIEVEMENTS AGAINST AGREED KPIS

The following set of Key Performance Indicators (KPIs) (in italics) were incorporated in the original Centre proposal. Achievements against relevant KPIs for 2016 are provided.

Research

Publications, journals and conferences.

Chen, C., and Kavanagh, L., *Pedagogical differences in Engineering Education at Taiwanese and Australian universities*, Proceedings of 27th Conference of the Australasian Association of Engineering Education (AAEE 2016), Coffs Harbour, NSW, Australia. 4-7 December 2016

Dearden, E., Duck, J. M., Matthews, K. E., Kavanagh, L., McGrath, D., Adams, P. and Simbag, V. (2016). *Teaching induction program evaluation: a research intensive institution perspective*. In: Higher Education Research and Development Society of Australasia Conference, Fremantle, WA, Australia. 4-7 July, 2016.

Knight, D.B., Cameron, I.T., Hadgraft, R.G. and Reidsema, C. (2016) *The influence of external forces, institutional forces, and academics' characteristics on the adoption of*

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positive teaching practices across Australian undergraduate engineering. International Journal of Engineering Education, 32(2): 695-711.

Matthews, K. E., Adams, P. and Goos, M. (2016) *Quantitative skills as a graduate learning outcome: exploring students' evaluative expertise.* Assessment & Evaluation in Higher Education. 1-16. doi:10.1080/02602938.2016. 1161725

Matthews, K. E., Adams, P. and Goos, M. (2016) *Quantitative skills as a graduate learning outcome of university science degree programmes: student performance explored through the planned–enacted–experienced curriculum model.* International Journal of Science Education, 38 11: 1-15. doi:10.1080/09500693.2016. 1215568

McCredden, J., O'Shea, P., Terrill, P. and Reidsema, C. (2016) *Don't blame the student, it's in their mind: Helping engineering students to grasp complex concepts,* Proceedings of 27th Conference of the Australasian Association of Engineering Education (AAEE 2016), Coffs Harbour, NSW, Australia. 4-7 December 2016

Reidsema, C., Kavanagh, L. and McCredden, J., (2016) *Project Design and Scaffolding for Realising Practitioner Learning in a Large First Year Flipped Classroom Course,* Proceedings of 27th Conference of the Australasian Association of Engineering Education (AAEE 2016), Coffs Harbour, NSW, Australia. 4-7 December 2016

Reidsema, C., Kavanagh, L., Ollila, E., Otte, S. and McCredden, J. (2016) *Exploring the quality and effectiveness of online, focused peer discussions using the MOOCchat tool,* Proceedings of 27th Conference of the Australasian Association of Engineering Education (AAEE 2016), Coffs Harbour, NSW, Australia. 4-7 December 2016

Invited keynotes/presentations

Kavanagh, L. *Supporting student teams: Processes and Tools,* The Global Canopy and STEM showcase, RMIT University, Melbourne, 11 April 2016

Kavanagh, L., Reidsema, C. and Sutton, P. *Collaborative development in eLIPSE,* Cross Institutional Learning Designers Forum, UQ, Brisbane, 7 June 2016

Kavanagh, L. *Supporting Student Teams: Processes and Tools,* Queensland University Educators Showcase, UQ, Brisbane, 26 September 2016

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Invited workshops

Reidsema C. and Kavanagh L., *Transforming Learning – Mastering the Flip*, Queensland University of Technology, Brisbane, 22 March 2016

Kavanagh L. and Reidsema, C., *Proactively ensuring team success: Processes and Tools*, École Centrale Paris, Paris, 4 July 2016

Reidsema C. and Kavanagh L., *How to flip a classroom and land on your feet*, Coventry University, Coventry, 7 July 2016

Reidsema C. and Kavanagh L., *Transforming Learning – Mastering the Flip*, University of Sheffield, Sheffield, 12 July 2016

Reidsema C. and Kavanagh L., *Transforming Learning – Mastering the Flip*, Imperial College London, London, 13 July 2016

Kavanagh L. and O’Moore L., *Managing Student Behaviours You Don’t Understand*, 27th Conference of the Australasian Association of Engineering Education (AAEE 2016), Coffs Harbour, 4 - 7 December 2016.

Impact and uptake of Centre outputs: the extent to which Centre-developed resources are adopted/used by courses, programs and academics at UQ, possibly via migration to ITaLI and/or ITS support.

Information on uptake for the Learning Pathway, Help! AND MOOCchat is provided under Achievements against Agreed KPIs – Academic Development, on page 13.

Two academic groups, in addition the project founders in the School of Chemical Engineering, used the JourneyMaker in pilot mode during 2016 – the group in the School of Information Technology and Electrical Engineering who were developing the postgraduate suite of courses in Data Science and academics in the School of Agriculture and Food Science who were preparing for a major curriculum review.

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External impact and uptake: The extent to which Centre-developed resources are adopted by institutions beyond UQ.

The Peer Assessment Factor tool, disseminated by ITS within UQ as the UQ Peer Assessment Tool, was shared by ITS with QUT.

RMIT University, Southern Cross University, Coventry University, Sheffield University and Imperial College London requested copies of the Learning Pathway.

Working in Teams: A Practical Guide, a MOOC created by Lydia Kavanagh and David Neil, was offered through edX for the first time in 2016 and attracted 14,367 enrolments, including 56 verified participants. There have been 3 course reviews submitted by participants who have completed the course, all of which rated the course at 5 stars.

Southern Cross University trialled the Learning Pathway during 2016 and have now requested their own copy to run on their servers.

Grant Income from internal and external sources.

The following income into eLIPSE for grants awarded to eLIPSE directors was received in 2016:

UQ Technology Enhanced Learning Grant, *Student Learning Pathway: Providing students with individually tailored maps for planning and tracking learning trajectories*, 2014-2017, \$126,051 (continuing from previous year)

UQ Technology Enhanced Learning Grant, *Help! – A Blackboard-linked quality assured student communication and response system*, 2015-2016, \$52,400. (new in 2016)

Faculty of EAIT Teaching and Learning Grant, *MOOCchat: Online Peer Assisted Learning System for Large Classes*, 2016, \$92,937 (continuing from previous year)

Faculty of EAIT TQA Strategic Funding, *Students with Asperger Syndrome in EAIT Faculty: A framework for supportive management and better educational outcomes*, 2015-2016, \$250 (continuing from previous year)

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eLIPSE also received income for commissioned work related to the following grants awarded to other academic project leaders in the University:

UQ Technology Enhanced Learning Grant, *TheJourneyMaker: Enhancing curriculum design, program analytics and the student experience*, 2014-2016, \$140,670 (continuing from previous year)

UQ Technology Enhanced Learning Grant, *Enhancing student buy-in: pre-reading and feedback in the flipped classroom (Semant)*, 2015-2016, \$88,158 (continuing from previous year)

UQ Technology Enhanced Learning Grant, *An innovative, open-access online question and solution generator (SmartAss)*, 2015-2016, \$77,336 (continuing from previous year)

UQ Technology Enhanced Learning Grant, *Online, virtual and adaptive learning environments: improving the journey through large first year chemistry courses*, 2015-2016, \$3,238 (continuing from previous year)

Faculty of Science Teaching and Learning Grant, *Enabling widespread use of reading quizzes and enhanced feedback for active learning with Semant*, 2016, \$20,000 (new in 2016)

Deputy Vice-Chancellor (Academic) Teaching & Learning Grant, *Enhancing the Student Experience, EAIT Faculty*, 2016-2018, \$4,538 (new in 2016)

Student Experience

The number of students undertaking projects within the Centre (PhD, Masters, Bachelors).

The following students were undertaking projects associated with eLIPSE in 2016:

PhD students: Shaun Chen (Mechanical)

MPhil students: Diogo Quental de Sousa (Mechanical), Mohsen Dokhanchi (Mechanical)

MEngSc (Management) student: Xiangyu (Edward) Su (Mechanical)

B Engineering (Honours) students: Katelyn Hall BE Hons (Civil), Yi-Hsuan (Justin) Wu (Mechatronic).

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ENGG1600 students: James McCall, Henry O'Brien

Individual project feedback from focus groups, interviews etc. with students.

An example of positive student feedback was received from the School of Public Health from students enrolled in a postgraduate course PUBH7620, offered both internally and externally. In Semester 1 2016, the course was completely redesigned using the Learning Pathway, Learning Timeline and Help! flowchart.

When running one of the Adobe Connect sessions for the external postgraduate students the course coordinator received, without any prompting, comments on Help! and the Learning Pathway. The students were thrilled with how wonderful they were. They also commented that it was the best postgrad site they had accessed.

Unsolicited feedback from engineering student users of the Learning Pathway included:

- *Learning pathway on the blackboard is a really good help throughout the entire semester.*
- *The Blackboard page was far, far more helpful and well organised than any other courses.*
- *The step-by-step weekly pathway assisted me in organising my work.*

Student feedback on the Dashboard pilot included:

- *Average and Personal Mark clearly indicated and comparable.*
- *Great tool, everyone should have access to this!*
- *It shows everything I am interested in very clearly. I just wish I knew about it since the beginning of the course.*

Percentage of students actively engaged in on-campus learning activities.

This KPI was identified in the 2015 Centre Annual Report as pending implementation of University-wide tools that will facilitate the gathering of data and bench-marking in this area.

Academic Development

Implementation of Centre outputs as evidence of best practice teaching.

Help! is a 'self-help' communication tool embedded in a Blackboard course site that directs student queries in the first instance to appropriate resources or discussion forums. Where issues can't be resolved, students are asked to complete a customised form that asks what they have done to try and solve their problems, and an email message is sent via a job tracking system directly to a person nominated to handle queries of the nature identified by the student (e.g. technical query, personal problem, request for extension etc.).

In Semester 1 2015, a working Help! prototype had been created to address these challenges for ENGG1100. The new version of Help!, developed by eLIPSE in 2016 with TEL Grant funding, was trialled in 9 courses in Semester 1 – CHEM1090, CSSE1001, ENGG1100, ENGG1300, ENGG1400, ENGG1500, MATH1050, PHYS1002 and PUBH7620, with total course enrolments of 3,922. Help! was also used in the pilot Teaching@UQ Blackboard site. Help! was used by 12 courses in Semester 2 – CHEM2056, CIVL2360, ENGG1200, ENGG1400, ENGG1500, HLTH3001, HRSS3102/HRSS7102, MATH1051, MATH1052, MATH1061, PHYS1002, PUBH7000. This involved 4,732 course enrolments. Use by Teaching@UQ continued.

One of the biggest benefits of Help! is the ability to track requests sorted by student and ranked by time, importance or staff responsible. The system can keep track of what has been taken care of and what still needs to be done. Ticket-based support is private and secure. All related communications, including supporting documentation, are logged against a ticket ID. This provides staff with a full history of a request. Students receive answers to their tickets via email and can reply directly from their email.

Requests are allocated to the appropriate person which ensures students get quick, accurate, and helpful answers. Statistics allow course coordinators to see what time is being spent where, and where improvements can be made. Overdue tickets are flagged for immediate attention.

A student Help! Project Assistant was appointed to provide assistance to staff with setting up new Help! flowcharts and embedding them in Blackboard for Semester 2 2016.

Production of documentation for users was completed in Semester 2 and feedback on this

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documentation was received from Semester 2 users, which then informed modifications. The resultant *Help! Quick Guide* and *Help User Guide* (an extended 10-page user guide) are available on the eLIPSE Help! project webpage (<https://www.elipse.uq.edu.au/help>).



The **Semant** software has proved itself a valuable tool for marking the written quiz responses of students; however what makes it invaluable, is its place in the active learning pedagogy. The new upgraded version of Semant, developed by eLIPSE under TEL Grant funding, has streamlined the pre-reading quiz processes of setting, marking and providing feedback to staff and students. The improved user interface has increased the speed with which the user can work through the process, making it more attractive for the lecturer to engage in this kind of teaching practice. The tool promotes better staff-student engagement and peer to peer engagement within and external to the lecture space.

In Semester 1 2016, Semant was used in the teaching of ENGG1500, PHYS1001, PHYS1002, PHYS2055 and PHYS4040, with a total of 833 enrolments. In Semester 2, repeat offerings of ENGG1500 and PHYS1002 again used Semant, together with MATH1060, PHYS2082 and PHYS3080, with total student enrolments of 1,168.

In March, project leader, Professor Michael Drinkwater, demonstrated Semant successfully to 2 visiting international science education experts Carl Wieman (Nobel Prize winner in physics, Stanford) and Sarah Gilbert University of British Columbia (UBC). The visitors were very impressed; Professor Wieman was extremely keen to obtain a version he could use externally for education research experiments. Dr Gilbert advised that UBC had previously endeavoured to extract quiz data out of an earlier version of Blackboard without success.

eLIPSE developers worked with Dr Roy Duncan, ITS, who built the interface with Blackboard which is used by Semant. In keeping with the modularised approach embraced by eLIPSE and ITS, which creates solutions that can be used for more than one tool, the Semant interface was able to be modelled on the LTI integration already created by ITS for the Learning Pathway Dashboard.



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In 2014, the course coordinators for ENGG1200 collaborated with the University of California, Berkeley to trial **MOOCchat**, a real-time chat-based peer learning tool that had originally been designed for MOOCs. The tool was designed to facilitate peer discussion in small groups without the need to be co-located.

eLIPSE further developed the tool for UQ use with Faculty of EAIT Teaching and Learning Strategic Funding. The revised tool was piloted in 2016 in ENGG1200 (enrolment 921).

When students enter MOOCchat they are given a high-level quiz question and are asked to select the correct answer and provide written reasoning for their response. They are then allocated to a 3-person text-based chat session where they are able to view each other's responses and discuss each other's choices in relation to the question and concepts involved. When the session terminates, students are allowed to change their initial response and complete a survey of their experience.

eLIPSE research into outcomes for students resulting from the use of MOOCchat was published in the paper *Exploring the quality and effectiveness of online, focused peer discussions using the MOOCchat tool* (see page 8). In summary, it was found that MOOCchat experiences helped about 25% of the students to shift from incorrect answers prechat to correct postchat. Groups who had at least one member who was correct prechat showed greater gains in the short term. In the long term, students who ended up with more correct answers postchat fared slightly better on the subsequent mid-term exam. This was most true when the concepts were easy or medium, while harder concepts showed fewer learning gains as a result of the chats. The conclusion reached was that MOOCchat discussions are able to develop student understanding in an online, blended-learning course if the concept questions and the task goals are appropriately designed.

Although the target enhancements for the funded EAIT project are complete, MOOCchat enhancement will continue in 2017, with use extending to CHEM1100 students (1,401 enrolments in 2016).



The **Learning Pathway** (Stage 1 + Stage 2) is a Blackboard-embedded tool that provides students with individually tailored digital maps for planning and tracking learning

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trajectories. It allows them to understand what they should know and do to enhance the likelihood of success in a course, track their own progress within that course, benchmark their progress against their peers and monitor their progress relative to outcome goals set by academic staff.

By 2016, the Learning Pathway (Stage 1) was a mature tool with 83 UQ course sites across 5 faculties, up from 75 in 2015. Total course enrolments were 19,085. On the basis of experience in 10 courses in 2016 (8,984 course enrolments), the UQ Business School plans to implement the Learning Pathway in all courses from Semester 1 2017.

The Learning Pathway Dashboard (Stage 2) has been under development in 2016 and provides visualisation of student performance and engagement, benchmarked against their peers (“what I did”), and what the outcomes of those endeavours were (“how I did”), also benchmarked against the cohort. The Dashboard was piloted in ENGG1200, a course with 921 enrolments, in Semester 2. eLIPSE has set up a Dashboard for use by students enrolled in ACCT1101 in Semester 1 2017 (1,058 enrolments in 2016).

Consultation with Centre with respect to grant proposals.

Carl Reidsema was invited by Simon Buckingham Shum, Professor of Learning Informatics at University of Technology, Sydney, to join a reference group for a learning analytics grant through the Australian Technology Network of Universities Grants Scheme for Excellence in Learning and Teaching. The application was unsuccessful but it is expected that interactions on learning analytics will continue.

Number of academic-led technology enhanced learning (TEL) projects across the Faculties of Science and EAIT.

In 2016, the TEL grants were re-focussed as Teaching Innovation Grants, lessening the emphasis on tools development. The following new grant awards that involve work by eLIPSE were made in 2016:

Drinkwater, M., *Increasing student engagement in active learning through feedback on pre-reading quizzes (Semant)*, UQ Teaching Innovation Grant

Sutton, P., *TeamAnneal Stage Two – A Web Service for Purposeful Student Team Creation*, UQ Teaching Innovation Grant

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The TEL projects continuing from a previous year were:

Kavanagh, L., Hillock, P., Howes, T., Jennings, M., Lawrie, G., O'Moore, L., Reidsema, C., Wegener, M. and Landorf, C. *Help! – A Blackboard-linked quality assured student communication and response system*. UQ Technology-Enhanced Learning Grant

Jennings, M. and Lawrie, G. *An innovative, open-access online question and solution generator (SmartAss)*, UQ Technology-Enhanced Learning Grant

Drinkwater, M. and Davis, M. *Enhancing student buy-in: pre-reading and feedback in the flipped classroom (Semant)*. UQ Technology-Enhanced Learning Grant

Cameron, C., Sutton, P., Roberts-Thomson, S., Marks, G., Brown, D., Crosthwaite, C., Bryceson, K. and Birkett, G. *TheJourneyMaker: Enhancing curriculum design, program analytics and the student experience*. UQ Technology-Enhanced Learning Grant

Reidsema, C. *Student Learning Pathway: Providing students with individually tailored maps for planning and tracking learning trajectories*. UQ Technology-Enhanced Learning Grant

L. Kavanagh also continued to be actively involved in the *Teaching @UQ* Program, a 2014 TEL Signature Project.

eLIPSE was also involved in projects funded by Faculty Teaching and Learning Committees. The following project was new in 2016:

Davis, M., Drinkwater, M., Davis, T., McIntyre, T., Bowen, W., Weinhold, T., Corney, J., McKenzie, R., Wegener, M., Maenhaut, B., Bryant, D., Birkett, G. and Howes, T. *Enabling widespread use of reading quizzes and enhanced feedback for active learning with Semant*. Faculty of Science Teaching and Learning Grant

Projects related to the following Faculty Teaching and Learning/TQA Grants continued in 2016:

L. Kavanagh, O'Moore, L., Papinczak, T., Baldock, T., Sutton, P., Kizil, M., Landorf, C. and Birkett, G. *Students with Asperger Syndrome in EAIT Faculty: A framework for supportive management and better educational outcomes*. Faculty of EAIT Teaching and Learning Grant

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Reidsema, C., Kavanagh, L., Zou, J., Edwards, G., Fink, E. and Fox, A., *MOOCchat: Online Peer Assisted Learning System for Large Classes*. Faculty of EAIT Teaching and Learning Grant

Number of reports and presentations to faculties within UQ.

EAIT Teaching and Learning Forum – presentations on the Learning Pathway from a student perspective (by the eLIPSE Student Developers), 10 February 2016.

eLIPSE Showcase – presentation of eLIPSE capabilities and key eLIPSE-developed tools, 22 March 2016.

School Meeting, School of Mechanical & Mining Engineering – presentation on the Learning Pathway, 31 March 2016.

UQ Teaching and Learning Week, Workshop on the Learning Pathway and Dashboard. 1 November 2016

Attendance at workshops.

Total attendees at eLIPSE workshops/presentations numbered approximately 260, including RMIT University (29), Queensland University of Technology (47), École Centrale Paris (23) Coventry University (workshop-75, teamwork seminar-20, tools showcase-21), University of Sheffield (workshop-32), Imperial College London (workshop-16, teamwork seminar-10, tools showcase-10), Queensland University Educators Showcase (25), T&L Week Workshop (10).

Feedback on the flipped classroom format of the workshop conducted at QUT included the following:

So pleased to see you applying flipped classroom in this workshop, I'm so tired of going to educational conference presentations that are just didactic. This is much more engaging, meaningful and memorable.

In addition to these workshops, there were also a number of tool-specific workshops conducted for user reference groups. Workshops for Semant users were conducted in February and in May, with attendance of 9 at each. The fourth workshop for the JourneyMaker Workshop user reference group was held in April, with 18 in attendance and

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the fifth JourneyMaker workshop in October attracted about 40 people. The number of those seeking invitations has grown continuously over the 2 years of the project. A user feedback meeting for Help! was conducted in June with 7 attendees.

Student Learning

Individual project evaluation of changes in student outcomes.

Detailed information relating to MOOCchat is provided on page 15.

Analysis of student team appraisals of course scaffolds, which integrate learning designs with technology (Learning Pathway, Casper and MOOCchat among others), revealed that the distributed scaffolding method for providing cognitive apprenticeship experiences for students was positive overall. This is discussed in the paper *Project Design and Scaffolding for Realising Practitioner Learning in a Large First Year Flipped Classroom Course* listed under Research on page 8.

Overall improvements to Institutional course evaluations.

Current eLIPSE research is improving understanding of how students learn, and how to use learning analytics to personalise and improve their student experience. As part of the Learning Pathway project, eLIPSE has created a Dashboard for students that allows them to see both their performance and activity benchmarked against the rest of the cohort.

The outcomes of this work will have a significant positive impact on development of a cohesive approach across UQ to use of learning analytics for improvement of the student experience, through cooperation with ITS and ITaLI towards a common web-based application framework and data infrastructure. Understanding student learning and engagement through considered learning analytics design allows eLIPSE to develop tools that are fit for purpose, aligned with UQ's Strategic Plan and mapped to a coherent and unified development framework that reduces redundant effort.

It is the missing component in UQ's strategic effort to improve the student experience and will allow Executive Deans and Heads of School to derive reasonable, measurable metrics that can assist with demonstrating improved student learning engagement and outcomes over and above the measures provided by student evaluations.

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Additional Evidence for Centre Performance

Number and level of people employed by eLIPSE

The Centre employed the following numbers and categories of staff in 2016:

Research Staff

Research Academic Level A	1
Research Professional HEW 6	1

Software Developers

Research Professional HEW 7	1
Research Professional HEW 6	1
Research Professional HEW 5	3
Research Professional HEW 4	3

Administration

Research Professional HEW 6	1
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TOTAL **11**

The HEW 4 staff are Casual Student Developers who bring the student voice to the development of tools for use by students.

Funding Sources

eLIPSE received funds from diverse sources in 2016 including:

DVC(A) TEL/TIG Grants: \$154,100

Faculty T&L Grants: \$116,292

Sales of services to schools outside eLIPSE holding internal/external grants: \$335,769

Donations/sponsorship: \$25,000 (John Barnes), \$23,712 (Boeing), \$30,000 (Royal Australian Navy)

Faculty/School additional support: \$10,000

Achievements 2016

Internal Collaborations

eLIPSE is fostering strong links with ITaLI and collaboration in 2016 included the following:

- Provision of educational design and software development assistance to the UQx team in ITaLI in the finalisation of a MOOC;
- Provision of software development assistance to the ITaLI Learning Analytics group to assist with data extraction, data processing and data visualisation in support of UQ dashboard development; and
- Regular participation of eLIPSE personnel in ITaLI Learning Analytics lunchtime discussions organised by Marcel Lavrencic.
- Attendance of ITaLI's Project Manager TEL Grants at eLIPSE Leadership Team meetings.

The Faculty of EAIT has established a 2-year project, *Enhancing Student Experience*, funded by the DVC(A), the Faculty of EAIT and eLIPSE. It is designed to enhance the student experience through curriculum, pedagogy and assessment improvement, particularly addressing courses "at risk". Two education researchers and one educational designer were appointed from July/August and co-located with the eLIPSE Research Officer and the EAIT Educational Designer (eLearning).

eLIPSE forms partnerships with academic project leaders in schools across the University when development work is undertaken for their projects. eLIPSE staff work in collaboration with academics through regular development meetings with key stakeholders for each project in hand. Positive feedback on this experience was received from Professor Michael Drinkwater who led the Semant project:

The great success of the project was the professional development made possible by working with the eLIPSE software group.

External Collaborations

Southern Cross University trialled the Learning Pathway in 2016 and have requested approval to run it from their own servers in 2017.

Collaboration continued during 2016 on the production of a textbook, *The Flipped Classroom - Practice and Practices in Higher Education*, which involved practitioners from 5

Achievements 2016

universities in Australia, as well as from the University of Pittsburgh, St Andrews University and Nanyang Technological University. Publication is expected in March 2017.

Institutional and External Recognition

On 29 November 2016, at the ASCILITE Conference in Adelaide, eLIPSE received the ASCILITE 2016 Award for Excellence in Learning Analytics. The successful submission, *Supporting students' ownership of their learning with analytics*, can be viewed at –

<http://www.elipse.uq.edu.au/supporting-student-ownership-of-learning-with-analytics>

Financial Summary 2016

Financial Summary 2016

	\$
<u>Income</u>	
Internal Grants	246,392
Faculty/School Allocations	34,000
Fee for Service	335,769
Donations, Sponsorship	78,712
TOTAL INCOME	694,873
<u>Expenditure</u>	
Salaries – Developers	488,297
Salaries – Research Staff	114,465
Salaries – Administration	75,020
Scholarships	6,322
Conferences/Workshops	3,471
General Operating Expenses	4,289
TOTAL EXPENDITURE	691,864
OPERATING SURPLUS	3,009

Staffing

With the increased project commissions for software development won in 2016, the eLIPSE Development Team was augmented by the appointment of 2 additional Graduate Web Applications Developers. The former Learning Technologies Developer position was upgraded to become the Software Development Manager for the eLIPSE Development Team.

A specialist visualisation programmer, Dr Erzebet Németh, was appointed in the School of Chemical Engineering to work on the JourneyMaker project, and was co-located with the eLIPSE Development Team, facilitating cooperation on development of the visualisation functionality of that tool.

A student was appointed as a Help! Project Assistant to provide assistance to staff with setting up new Help! flowcharts and embedding them in Blackboard in the lead-up to Semester 2.

The following people were employed by or affiliated *ex officio* with the Centre in 2016:

AFFILIATED STAFF

Centre Director, Carl Reidsema, Faculty of EAIT/School of Mechanical and Mining Engineering

Program Director (Research Excellence), Lydia Kavanagh, Faculty of EAIT

Program Director (Technology, Tools and Learning Analytics), Peter Sutton, Faculty of EAIT/School of information Technology and Electrical Engineering

Program Director (Partnerships), Peter Adams, Faculty of Science/Office of the President of the Academic Board

Educational Designer (eLearning), Esther Fink, Faculty of EAIT

CENTRE EMPLOYEES

Software Development Manager Phil Waller

Web Applications Developer Sandesh Maheshwari

Staffing

Graduate Web Applications Developer	Callum Buckmaster
Graduate Web Applications Developer	James Li (commenced 23 May 2016)
Graduate Web Applications Developer	Andrew Mooney (commenced 27 June 2016)
Student Developer	Nicholas Achilles (commenced 23 May 2016)
Student Developer	Rachel Catchpoole (departed 1 April 2016)
Student Developer	Glen Javier
Student Developer	Roy Portas
Help! Project Assistant	Siyu Liu (from 25 June to 19 August 2016)
Research Officer	Julie McCredden
Research Assistant	Neville Smith
Centre Administrator	Ellen Juhasz

VISITORS

Visitors to the Centre in 2016 included the following.

On 4 April 2016, eLIPSE hosted a combined visit by university staff investigating large scale teaching practices and spaces. The group comprised:

Coventry University: From the Faculty of Engineering, Environment and Computing, Paul Greening, Associate Dean (Student Experience), Damien Foster (Head, School of Computing, Electronics and Mathematics), Ray Farmer (Deputy Dean), Liz Smith (Operations Manager), Laura Jane Curtis (Year 2 Mathematics Student).

Queen's University (Kingston, Ontario): Brian Frank, DuPont Chair in Engineering Education Research and Development.

Monash University: Kris Ryan, Academic Director, Office of the Vice-Provost, Learning and Teaching.

On 31 August 2016, Mr John Barnes, a benefactor and UQ Bachelor of Engineering graduate with an interest in professional development of engineering educators, visited UQ and met the eLIPSE Development Team as well as touring engineering facilities with Carl Reidsema and a student representative.

On 28 November 2016, Dr Janelle Wilkes, senior lecturer in the School of Environmental and Rural Science at the University of New England visited for discussions around eLearning practice for First Year Engineering.

On 3 November 2016, Dr Marina Iskhakova, Program Manager/Lecturer in the Research School of Economics, ANU College of Business and Economics, visited to seek information on flipped classroom implementation at UQ.

Contact Information

Contact Information

DIRECTORS

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Centre Director

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Program Director
(Research Excellence)

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Program Director
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List of Acronyms and Initialisms

List of Acronyms and Initialisms

ASCILITE	Australasian Society for Computers in Learning in Tertiary Education
DVC(A)	Deputy Vice-Chancellor (Academic)
EAIT	Faculty of Engineering, Architecture and Information Technology, UQ
eLIPSE	Centre for eLearning Innovations and Partnerships in Science and Engineering, UQ
KPI	Key Performance Indicator
ITEE	School of Information Technology and Electrical Engineering, UQ
ITS	Information Technology Services, UQ
ITaLI	Institute for Teaching and Learning Innovation, UQ
LTI	Learning Tools Interoperability
MOOC	Massive Open Online Course
QUT	Queensland University of Technology
STEM	Science, Technology, Engineering, and Mathematics
T&L	Teaching and Learning
TEL	Technology Enhanced Learning
TIG	Teaching Innovation Grant
TQA	Teaching Quality Assurance
UBC	University of British Columbia
UQ	The University of Queensland