Is Learning How to Learn the Superpower for the Age of AI?

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School of Education
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The University of Queensland

Year: 2038


THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA
Student ABC
having fulfilled the conditions
prescribed by the University in, on this day,
conferred the degree of
BACHELOR
OF
ARTS
IN THE FIELD OF ART THERAPY
GIVEN UNDER THE COMMON SEAL
OF THE UNIVERSITY OF QUEENSLAND
THE TWENTY-SECOND DAY OF JULY, 2011
CHANCELLOR
VICE-CHANCELLOR
ACADEMIC REGISTRAR
4/930665

How did we get here?

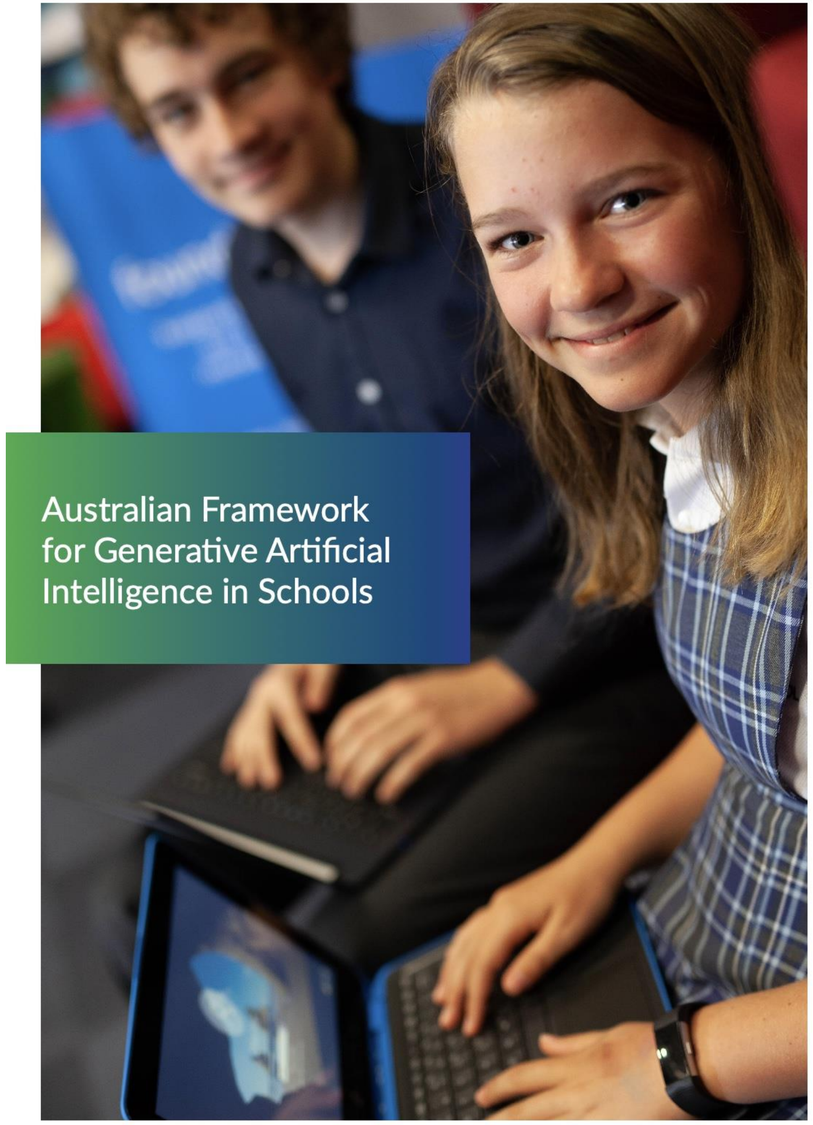


Image: Sophie Lindsay, Student, NSW Department of Education. Tom Lindsay, Teacher, NSW Department of Education.

Inquiry into the use of generative artificial intelligence in the Australian education system

The House Standing Committee on Employment, Education and Training adopted an inquiry into the use of generative artificial intelligence in the Australian education system on 24 May 2023 following a referral from the Minister for Education, the Hon Jason Clare MP.

The Committee invites interested persons and organisations to make a submission to the inquiry addressing the terms of reference by 14 July 2023. Information that may assist in preparing a submission to the Committee can be accessed here.

For further information about the inquiry or making a submission, please contact the committee secretariat.

Committee Secretariat contact:

PO Box 6021
Parliament House
CANBERRA
Canberra ACT 2600

Phone: +61 2 6277 4573
ee.reps@aph.gov.au

About this inquiry

The House Standing Committee on Employment, Education and Training has been asked to inquire into and report on the use of generative artificial intelligence in the Australian education system.

- Terms of Reference
- Submissions
- Media Releases
- Public Hearings
- Government Response
- Committee Membership

Track Inquiry

Past Public Hearings

06 Sep 2023: Canberra

more...

How to teach, learn and assess with AI

How to teach, learn and assess with AI

?

What does learning look like in 2023?

SELF-DIRECTION FOR LIFELONG LEARNING

A Comprehensive Guide to Theory and Practice

Jossey-Bass Publishers
San Francisco • Oxford • 1991

> 60,000 students

4 institutions

> 3,000,000 datapoints

~ 200 in depth interviews

9 separate studies

Data mining (enterprise systems)

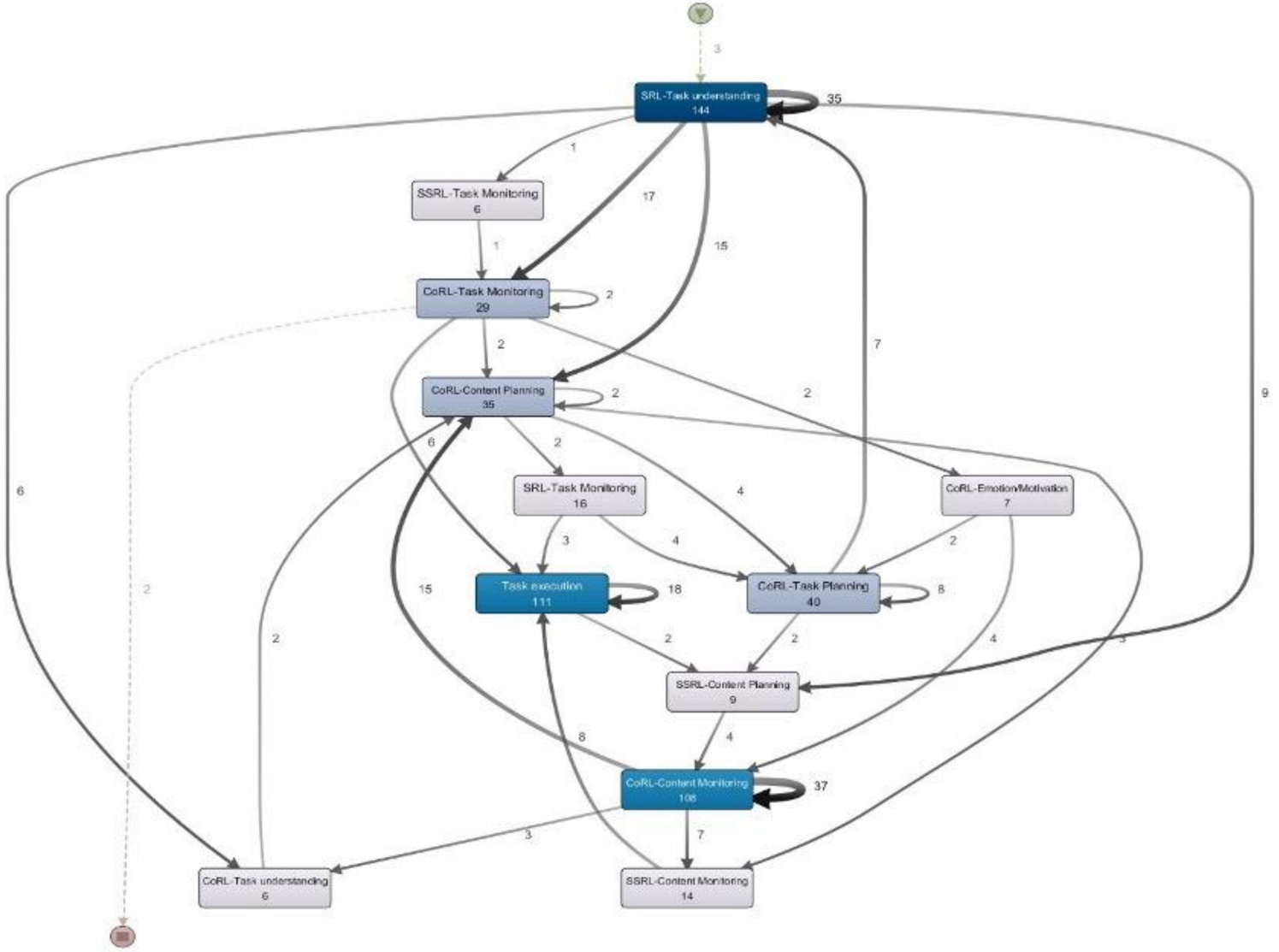
Experience sampling

Validated instruments (SRL-O)

Student evaluations

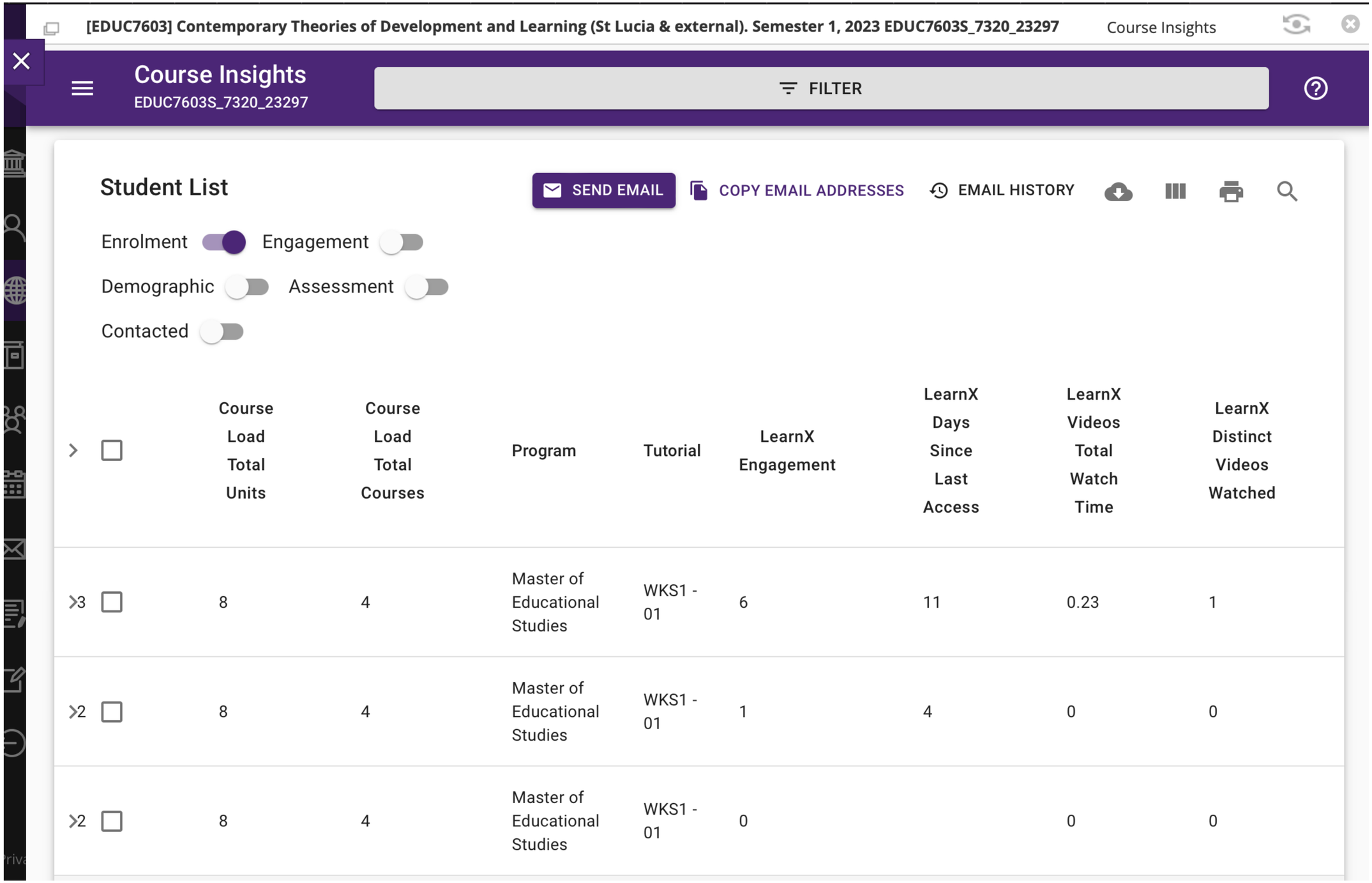
Interviews

What are students doing?



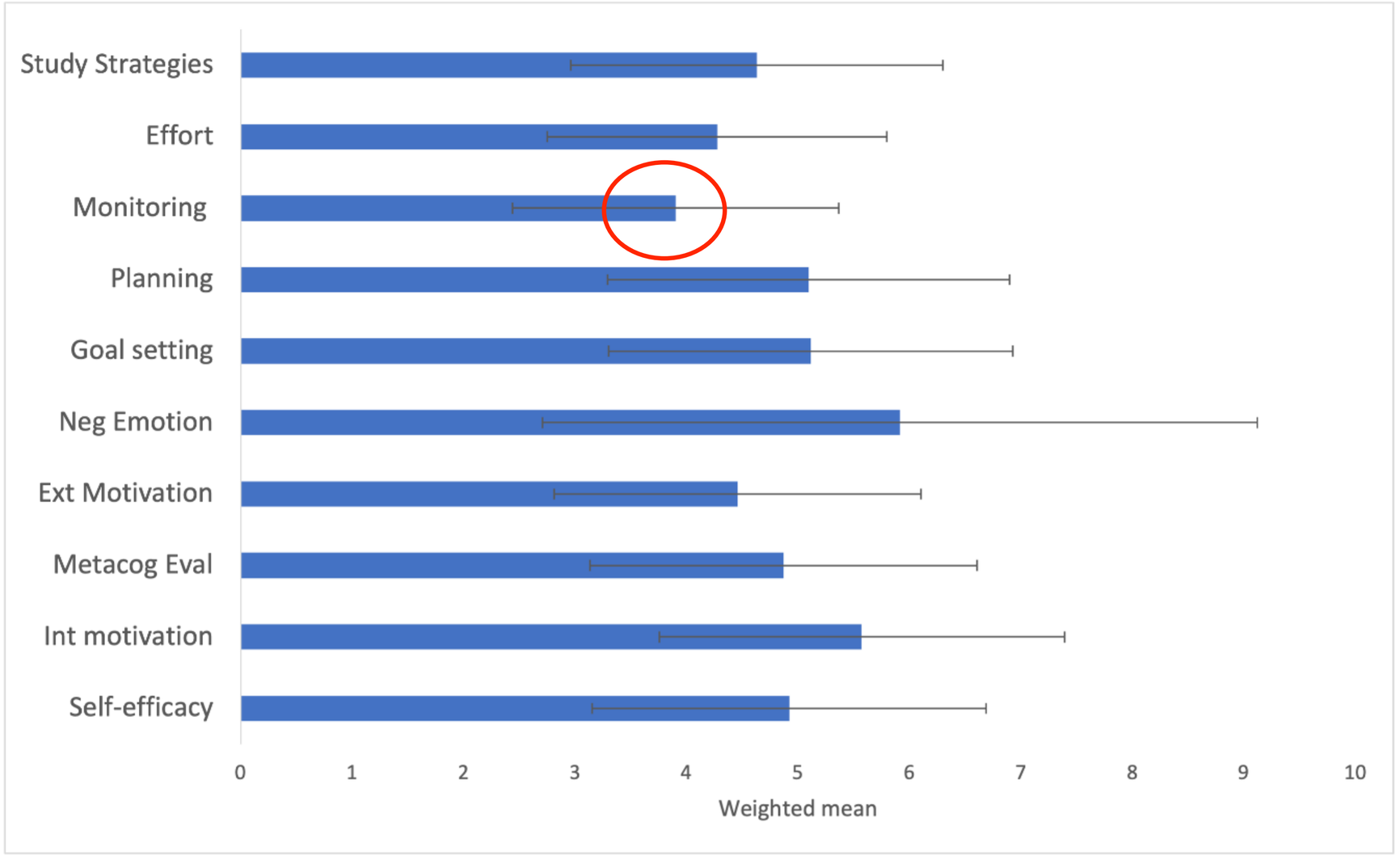
Process model of high-performing groups in overall collaborative sessions

Yang, S., Lodge, J. & Brooks, C. (under review)



	Course Load Total Units	Course Load Total Courses	Program	Tutorial	LearnX Engagement	LearnX Days Since Last Access	LearnX Videos Total Watch Time	LearnX Distinct Videos Watched
>3	8	4	Master of Educational Studies	WKS1 - 01	6	11	0.23	1
>2	8	4	Master of Educational Studies	WKS1 - 01	1	4	0	0
>2	8	4	Master of Educational Studies	WKS1 - 01	0		0	0

What are students saying?


Study Strategies
Effort
Monitoring
Planning
Goal setting
Neg Emotion
Ext Motivation
Metacog Eval
Int motivation
Self-efficacy
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4
5
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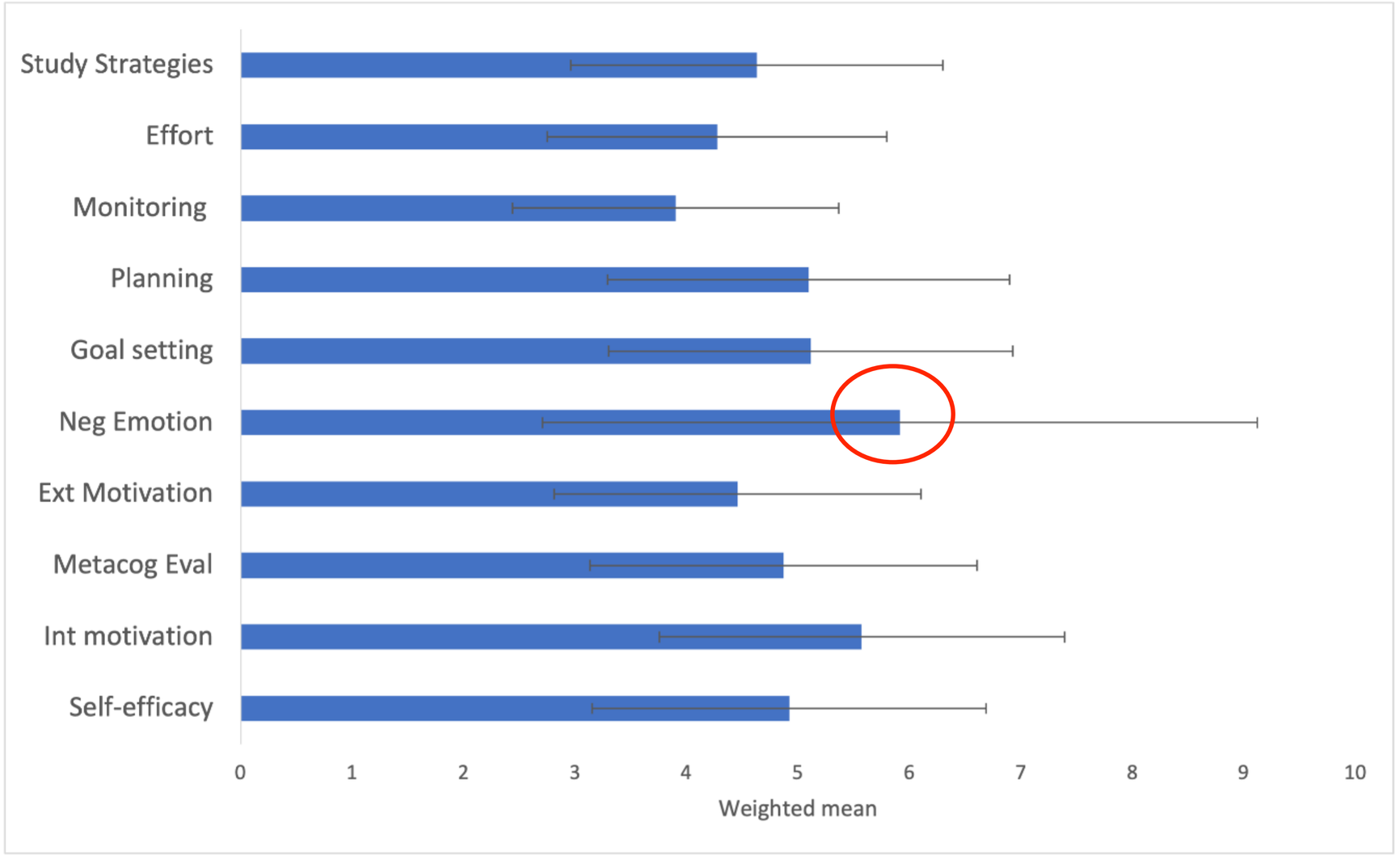
7
8
9
10
Weighted mean

How are students feeling?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Weighted mean

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Learning with Generative Artificial Intelligence Within a Network of Co-Regulation

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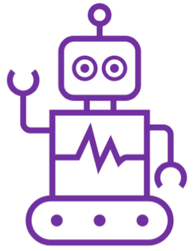
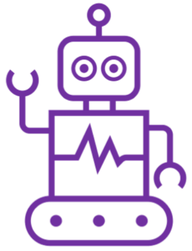
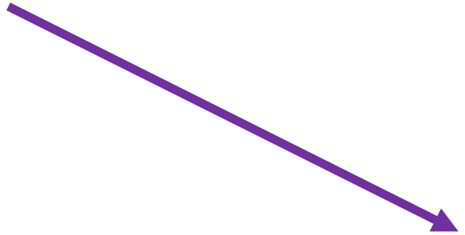
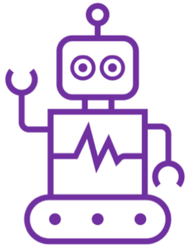
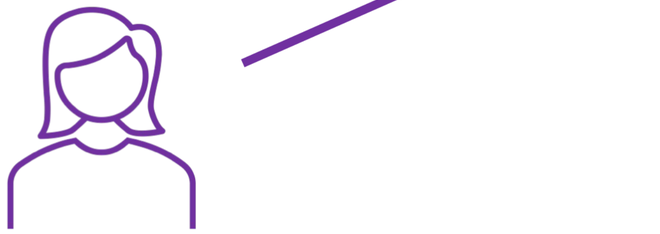
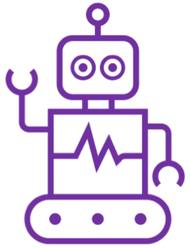


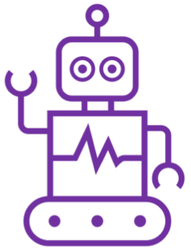


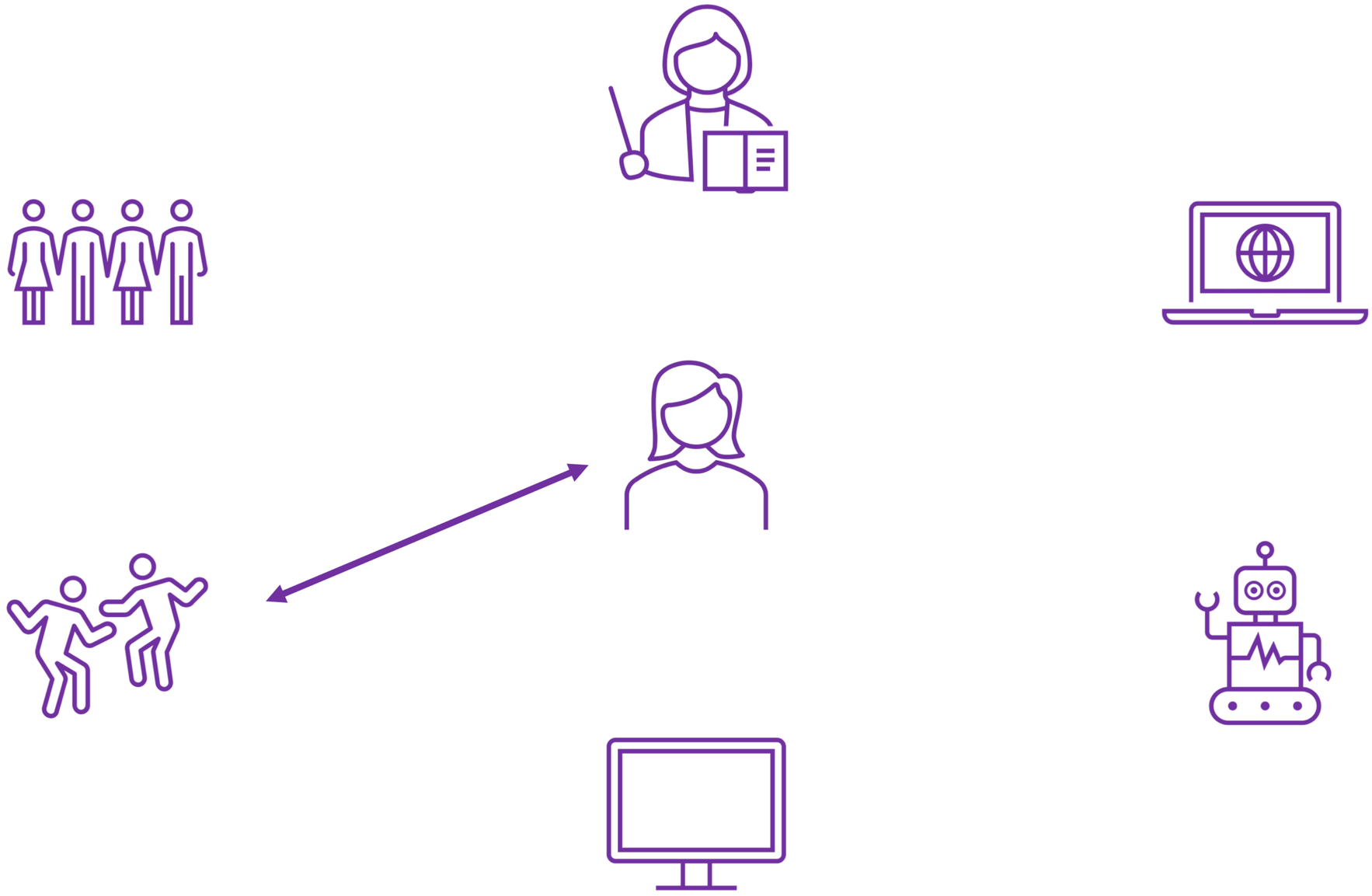




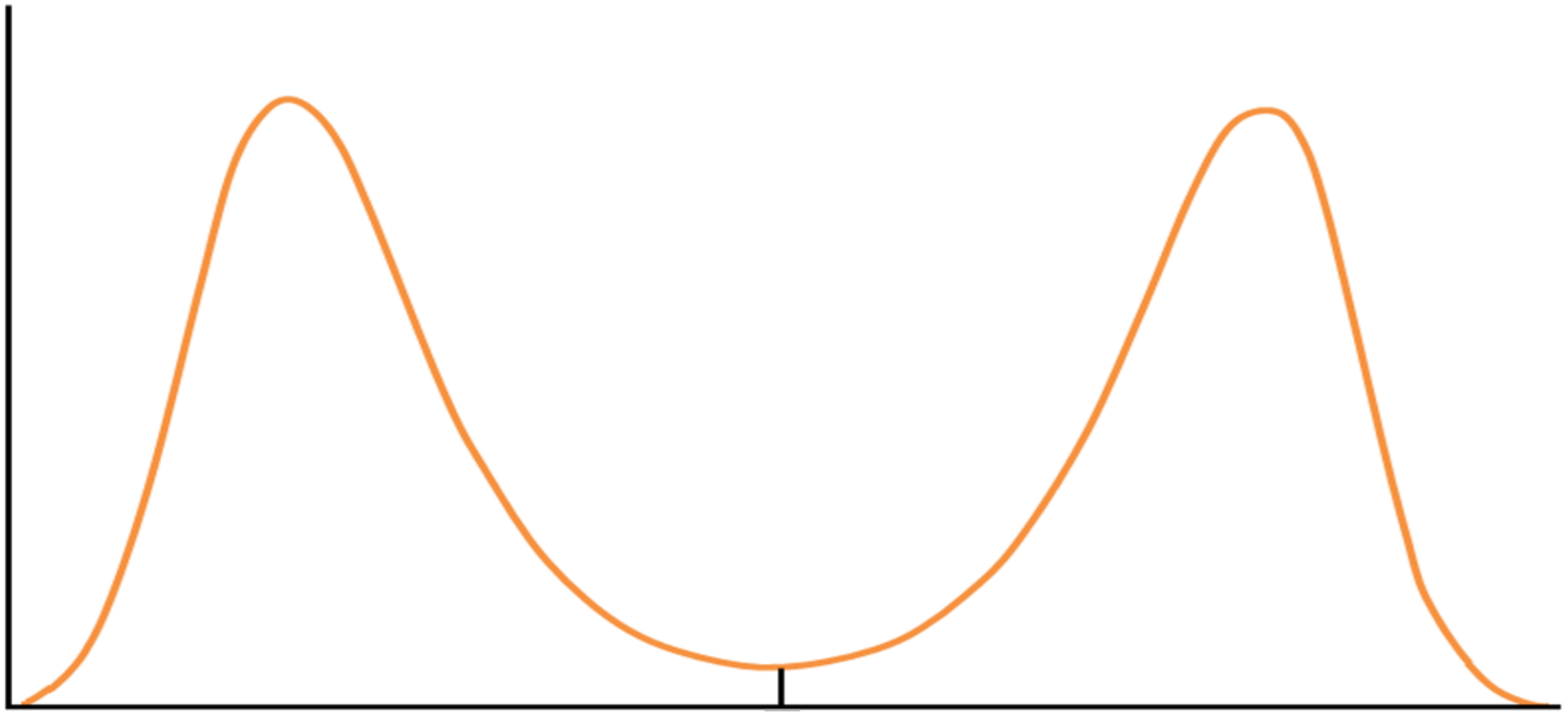




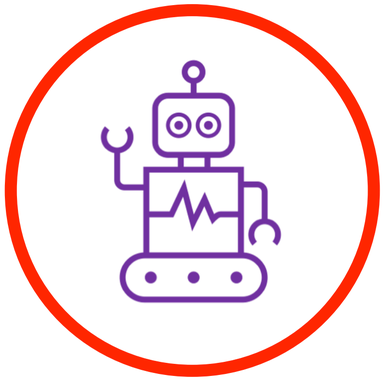




How are students achieving?



Grade distributions



What do we do about this?

Critical thinking?

The Critical Thinking Matrix

A high-resolution reference source for mapping critical thinking skills

Peter Ellerton, University of Queensland, Australia

Cognitive Skills		Values of Inquiry: Clarity (intelligibility)	Accuracy	Precision	Depth (Complexity, relevance and significance)	Coherence	Breadth (Alternatives, perspectives, collaboration)
Interpretation	**Categorising**	The criteria for categorising are unambiguous and the common characteristics of elements within the category are explicitly stated.	Categorical distinctions are drawn from accurate representations or generalisations of characteristics. Hasty generalisations are avoided.	Categorical distinctions are based on quantifiable data, specific characteristics or clear logical definitions.	Categorisations are made using relevant and significant characteristics rather than superficial resemblances. Logical and causal relationships between categories are identified.	Logical distinctions between categories are appropriate and coherent. The logical relationships within and between categories is evident.	Alternative perspectives and criteria for categorising are explored. Preferencing one framework over another is justified. Potential taxonimies are considered.
	Decoding	Terms are disambiguated and literal and intended meanings are distinguished when necessary. Implied meaning and social contexts are identified. Symbolic representations are identified and explained.	Intended or implied meaning is preserved in decoding. Literal and intended meanings are distinguished. Accurate use of symbols is evident.	Key terms are appropriately used to describe the information content. Correct procedures for working with quantitative or symbolic data are followed. Symbolic representations are used effectively.	Specific information is identified and foregrounded. Meaning is preserved by maintaining logical or causal relationships. Mastery of symbolic representation includes understanding the meaning of complex operations.	The logical content of propositions, phrases or terms is made clear and placed in context. The relationships between elements are understood.	Alternative meanings resulting from other cultural or cognitive perspectives are explored. Different interpretations of the situation are considered.
	Clarifying meaning	Key terms and technical terms are identified and explained. Literal and intended meanings are distinguished as necessary. Clarity is preserved as information moves between formats.	Statements are appropriately qualified. Limitations of understanding and representation are acknowledged. Intended or implied meaning is preserved. Paraphrasing and elucidation retain meaning.	Vagueness and ambiguity of terms and meaning identified. Key and technical terms identified and examined for appropriate use.	Nature and complexity of the problem understood and represented. Analogies or relevant similarities and illustrations used to elucidate and explain. Language examined for 'spin'.	Logical structures identified and logical coherency determined.	Language and visualisations reflect the need to cater for a diverse audience holding alternative views, approaches or perspectives.
Analysis	**Examining ideas**	Procedures of investigation are made explicit. Key concepts and structures are identified and named. Technical terms are used.	Faithful reproduction of information. Inaccuracies or contradictory information identified. Inferential relationships identified.	Detail preserved and reported. Vagueness and ambiguity eliminated or addressed. Technical terms are used appropriately and effectively.	Relevant and significant information is identified and foregrounded. Areas of focus are established. Problematic aspects are identified. Information necessary to frame and address the problem is identified. Ideas are compared and contrasted.	Causal and logical relationships are identified. Evidence is presented and evidential and inferential relationships are tested. General logical structure is identified and examined. Ideas are tested against existing knowledge.	Ideas are analysed within a transdisciplinary or collaborative approach, and through a variety of perspectives, including social, political, cultural and disciplinary.
	Identifying arguments	Premises and conclusions are made explicit. Argument structure is identified and discussed. Inferential pathways are articulated.	Argument types and structures are identified and named. Ambiguity is identified and addressed.	Nature of evidential material made clear. Procedures and algorithmic processes articulated in detail. Propositional content of premises and conclusions is identified and articulated.	The point at issue is identified. Relevant and significant information pertinent to the formation of premises is identified. Hidden premises are identified and dicussed.	Logical relationships examined to determine the nature and form of argument. Claims are extracted from text and evidential relationships identified. Argument is tested for validity.	Arguments framed in various ways are recognised as potentially representing different perspectives. Recognition that the acceptance of evidence may depend on personal context, experience and perspective.
	Argument deconstruction	Correct use of terms. Identification of key components of arguments. Supporting evidence made clear. Diagrams or mapping used to make argumentation clear.	Premises, conclusions and inferential relationships are accurately presented.	Correct use of terms, including 'valid' and 'sound'. Representations are explicit and accurate.	Problematic aspects of argument structure/complexity are explored. Relevant and significant information affecting the reasoning process is identified and its role explained.	Cogency of argument is noted. Evidential and inferential links are examined for logical consistency. Hidden premises and unstated assumptions identified. Cognitive biases identified or postulated Logical fallacies identified.	Relationships between unstated assumptions or elements, such as beliefs, are identified, and the effect this may have on the reasoning process is explored. Recognising limitations of a single discipline approach or of a single methodology.
Evaluation	**Assessing claims**	Evidence is presented in context. Direct links between evidence and claims are made explicit.	Claims are faithfully reproduced. Supporting evidence is accurately represented.	Detail of claims is preserved, including quantifiable aspects.	Direct links between evidence and claims are made explicit. Claims and conclusions are connected to the nature of the problem and of the evidence. Cognitive and social biases are explored. Assess the contextual relevance of questions, information, principles, rules or procedural directions.	Claims examined/assessed for logical coherence with each other and with evidence and methodology.	Recognising various levels of credibility that might be associated with varying perspectives about the claim. Understanding the nature of claims as a function of discipline or methodological approaches.
	Assessing arguments	Premises, conclusions and evidential relationships are articulated.	Strengths and weakness inherent in argument types, including inductive and deductive arguments, are identified in context.	Key terms are used correctly and amounts quantified where appropriate or necessary. The tools and processes of evaluation of inferences are explicitly stated.	Suitability of evidential relationships examined with regard to the nature of the problem. Proposed causal and logical relationships identified and examined for weaknesses and strengths.	Causal and logical connections tested. Inductive arguments are analysed for strength and weakness, including the use of analogies and generalisations. Deductive arguments are examined for validity and soundness. Logical fallacies identified and their effect on the argument assessed.	Additional information that may be necessary to strengthen the argument identified. Argument tested using alternative standards of various disciplines or methodological approaches.
	Synthesising claims	The synthesis is clearly derived from the constituent claims, with links made explicit.	Intended and implied meaning is preserved and generalisations and categorisations accurately represent the constituent claims.	Similarities and differences of positions are made clear, and quantified where appropriate or necessary, including how these affect the synthesis.	Relevant and significant information retained and highlighted in the synthesis. Inclusion and exclusion of material in synthesis explained. Common features identified from specific cases, both explicit and implicit.	Effective inductive generalisations made. Synthesis is coherent with the logical content of the constituent claims. Purpose and meaning are developed.	Awareness of the variety of beliefs and perspectives that may be compatible with a particular claim. Synthesis considered from various framings and axioms.
Inference	**Querying evidence**	Nature of evidence is clear and evidential relationships are articulated.	Evidence is faithfully reproduced and represented with honesty and charity.	Detail is sought and presented. Information is quantified where appropriate or necessary. Exact nature and role of evidence made clear.	Premises requiring evidential support are identified and strategies for seeking significant and relevant information that might inform or test hypotheses are determined.	Logical connections between matters of fact and the point at issue or problem to be solved are made clear. Implications of evidentiary material made clear.	Inquiry encompasses or takes into account various methodologies (e.g. transdisciplinary approach).
	Conjecturing alternatives	Possible inferential pathways (paths of reasoning) articulated based upon varying use of evidence and argumentation. Alternative hypothesis and potential conclusions are clearly expressed.	Inquiry and the exploration of alternative reasoning are sensitive to maintaining the integrity of evidence and information.	Alternatives supported by calculation or other algorithmic process.	Alternative hypotheses maintain the emphasis on significant and relevant information, as well as a focus on solving the problem. Complexity is managed and problematic causal and evidential relationships are addressed across possible outcomes.	Alternatives are logically coherent with the given information and their logical implications explored.	Alternative framing of problem explored. Collaborative or multidisciplinary reasoning employed.
	Concluding	Clear articulation of pathways from premises to conclusions, including use of evidence and argumentation.	Proper and correct use of algorithms or procedures to arrive at conclusions. Correctly identify evidential and inferential relationships and show how these lead to conclusions.	Conclusions contain specific and detailed information, quantified where appropriate or necessary.	Modes of reasoning used and conclusion reached appropriate to the nature of the problem.	Logical connections between premises and conclusions evident and explained. Inferences well-supported. Cogent approach taken (i.e. appeal to reason).	Conclusions reached using a variety of reasoning modes, such as mathematical, dialectic, scientific, inductive and deductive.
Explanation	**Stating results**	Correct use of terminology, unambiguous use of language and effective and clear categorical distinctions made. Explicit representation and explanation.	Statements, descriptions, diagrams and other representations maintain the integrity of information.	Detail preserved and presented. Information quantified. Correct use of terms. Vagueness and ambiguity eliminated or addressed.	Information that is significant and relevant is highlighted. Problematic aspects are outlined.	Logical connections made explicit, showing links to evidence and conclusions. Implications made clear.	Presentation of statements, descriptions, diagrams and other representations are sensitive to interpretations other than those of the author.
	Justifying procedures	Effective use of examples and illustrations. Inferential pathways made explicit. Standards of evaluation explained and presented.	Inquiry and investigations are presented faithfully and not modified to suit the nature of the conclusions.	Process and conceptual development recorded. Calculations used to provide quantified data.	Strategies explored and evaluated. Nature of inquiry appropriate to the problem.	Methodologies, algorithms and other procedures supported by logical analysis. Reasons given for choosing areas of focus and minimising other information. Standards of evaluation explained and presented.	Evidential, conceptual, methodological, criteriological and contextual considerations are made with reference to the nature of justification as a function of alternative perspectives, beliefs and suppositions.
	Presenting arguments	Argumentative prose, diagrams, charts, graphs and graphics convey a clear meaning, adhering to convention. Points at issue clearly defined and stated.	Evidence faithfully reproduced and counter-arguments and criticisms engaged with honesty and charity.	Quantitative data included. Unnecessary information is minimised.	Identify and address counter-arguments. Causal and logical relationships that relate to the situation or problem are identified and their role made explicit. Problematic aspects identified and solutions explained.	Logical structure and coherence evident. Well-supported inferences with implications explicitly represented.	Cogent presentation but with due consideration of various reasoning modes and how alternative perspectives may influence the acceptance or definition of evidence.
Self regulation	**Metacognition**	Reflective practice is evident and cognitive development across issues is clearly reported.	Authentic representation of students' own metal processes and cognitive development.	Reflection targeted to specific processes and outcomes.	Reflections show personal engagement with significant and relevant issues. Threshold (key) ideas and concepts are identified. Deficiencies in personal knowledge that may impact rational or objective analysis acknowledged and managed.	Logical analysis of own thoughts comparable in scope and rigour to analysis of others'.	Recognition of bias, erroneous thinking or fallacious reasoning. Collaboration sought for the purpose of testing own thoughts.
	Self-correction	Recognition of bias, erroneous thinking or fallacious reasoning is recognised and reported.	Self-criticism and redirection is authentic and resembles the criticism that would be made of third persons.	Reflection leads to specific and detailed changed or specific courses of action are articulated.	Revisions geared to improve outcomes and examined for consequences to original position, findings, or opinions.	Recognition and acceptance of logical errors in preliminary thinking. Rational conclusions contrasted with personal preferences or bias.	Willingness to modify thinking through collaborative inquiry. Self-correction seen as progress.

Cognitive skills modified from Facione, P. A. (1990). Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction. Values of inquiry concept from Kuhn, T. S. (1970). The Structure of Scientific Revolutions. International Encyclopedia of Unified Science. Chicago, University of Chicago Press. 2. Values of inquiry modified from Elder, L. and R. Paul (2001). "Critical Thinking: Thinking with Concepts." Journal of Developmental Education 24(3).

	Humans	Robots
Interpretation		
Analysis		
Evaluation		
Inference		
Explanation		
Self-regulation		

	Humans	Robots
Interpretation		
Analysis		
Evaluation		
Inference		
Explanation		
Self-regulation		
	0	1

	Humans	Robots
Interpretation		
Analysis		
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Explanation		
Self-regulation		
	0	2

	Humans	Robots
Interpretation		
Analysis		
Evaluation		
Inference		
Explanation		
Self-regulation		
	1	2

	Humans	Robots
Interpretation		
Analysis		
Evaluation		
Inference		
Explanation		
Self-regulation		
	2	2

	Humans	Robots
Interpretation		
Analysis		
Evaluation		
Inference		
Explanation		
Self-regulation		
	2	3

	Humans	Robots
Interpretation		
Analysis		
Evaluation		
Inference		
Explanation		
Self-regulation		
	3	3

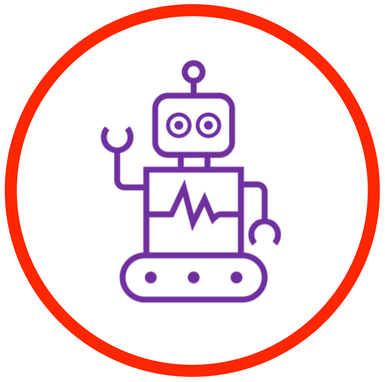
Evaluation/judgement

Sensemaking

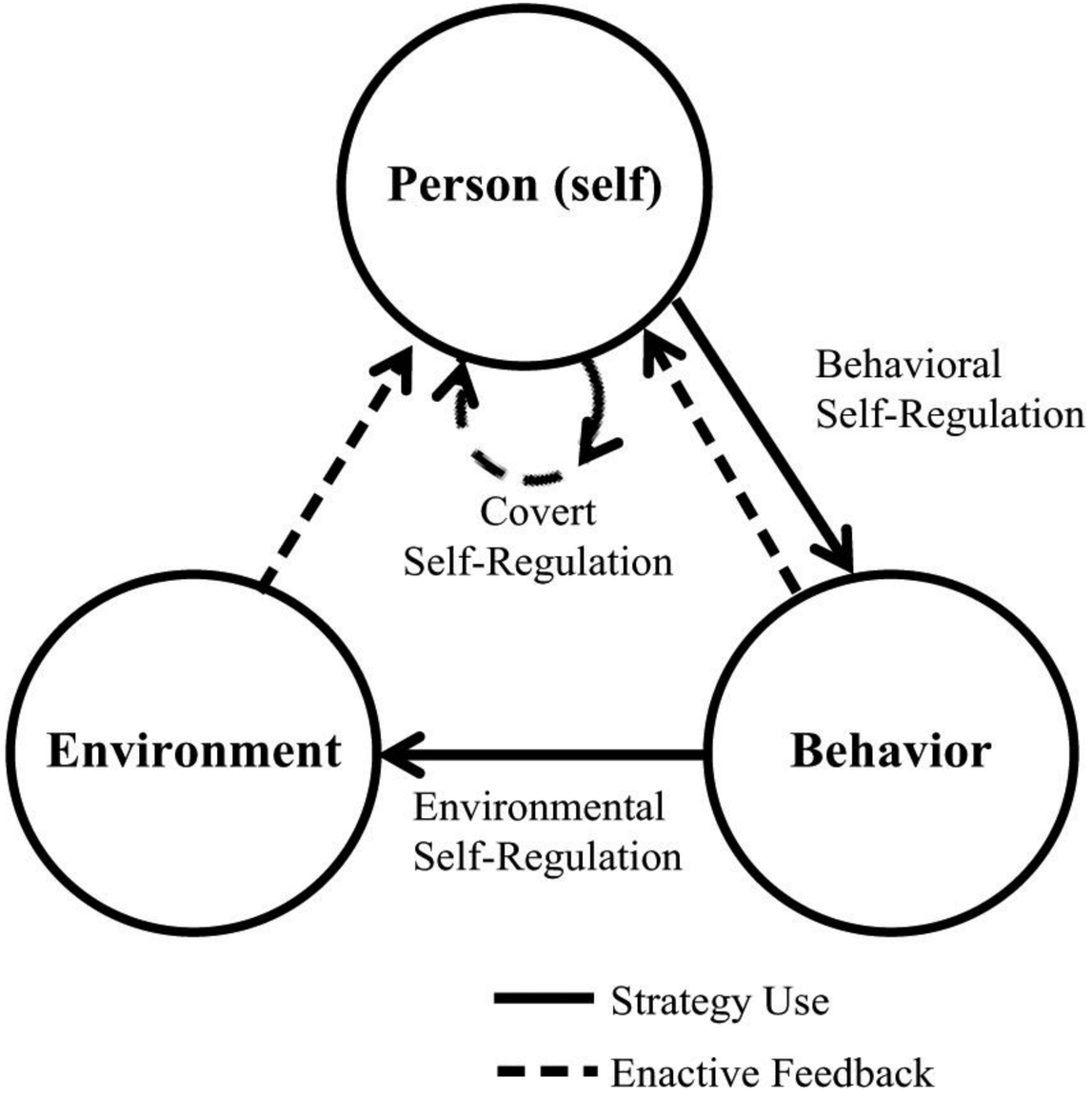
Self-regulated learning

(motivation and emotion)

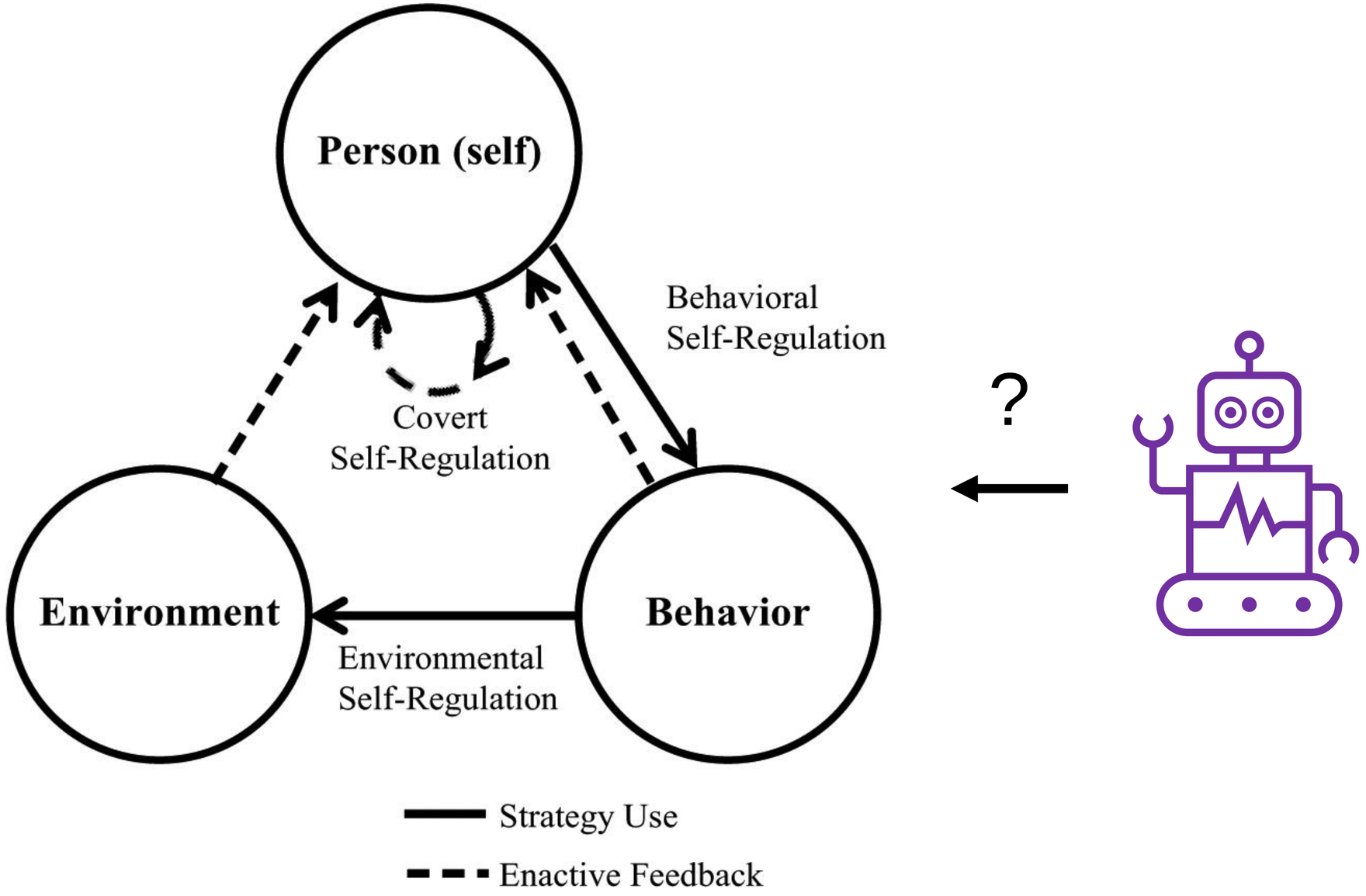
What are we really talking about here?



We can’t expect students to make the most of learning with and using AI if they don’t understand their own learning



Adapted from Zimmerman (1989)



Adapted from Zimmerman (1989)

Thank you

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Faculty of Humanities, Arts and Social Sciences
The University of Queensland

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AUSTRALIA
CREATE CHANGE