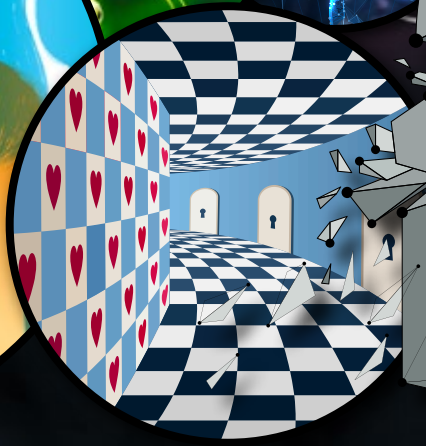
Epistemic Insight

THE FUTURE OF KNOWLEDGE



Canterbury Christ Church University

Epistemic Insight

A NEW EPISTEMIC INSIGHT INITIATIVE:

THE FUTURE OF KNOWLEDGE

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Prepared for
the LASAR Advisory Board

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1 FOREWORD

I am delighted to introduce this research proposal, developed by the LASAR Research team working in collaboration with specialists in physics, biology, philosophy, engineering, education, computer science, dance and many more disciplines, exploring "What is the Future of Knowledge?"

For the last six years, research and development into epistemically insightful approaches to education has produced an impressive impact in teacher education, schools and schools outreach in England. By opening classrooms to 'Big Questions', the rewards have included a new enthusiasm for learning together with creative and critical thinking about how to respond to society's most pressing questions and issues. Science education in particular has benefitted from a shift towards a less compartmentalised and siloed system. Research shows that 'EI' (epistemic insight) workshops can raise the attainment and aspirations of students who would not usually see themselves as prospective university students. We are now seeing encouraging signs of a sea-change in how schools help students to get to grips with the multi-disciplinary nature of knowledge.

It is exciting therefore to see that in this proposed new Initiative, the international reach and depth of the research will be increased. Additionally, the proposed research will engage with the landscape of Higher Education. It is well established that critical thinking, creativity and problem-solving are some of the most 'in demand' skills – both for the labour market and in projects that aim to increase human flourishing. These skills call for expertise in multidisciplinary reasoning and students and society will benefit if graduates are ready to critically engage, work with and apply different types of knowledge. In a society increasingly dependent upon a fast-moving technology sector we also need graduates who are ready to grapple with the benefits and limitations of machine learning and artificial intelligence for enriching our lives.

I am persuaded that if universities can capture the power and potential of epistemically insightful learning, tomorrow's graduates will be ready to make their mark in our collective journey towards mutual flourishing.

Professor Rama Thirunamachandran,
Vice-Chancellor and Principal, Canterbury Christ Church University

2 AIMS OF THIS PROPOSED INITIATIVE

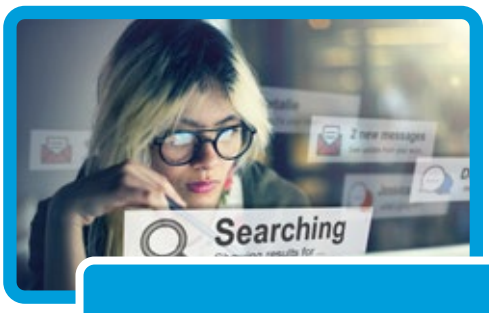
Epistemic insight is defined as 'knowledge about knowledge especially knowledge about disciplines and how they interact'. In the education context, epistemic insight concerns the gift of sightedness into how knowledge works – together with the capacity to think critically about the nature, application and communication of knowledge – and the motivation and encouragement to ask and explore Big Questions.

Teaching and developing epistemic insight in our education system and university halls of scholarship are essential for human flourishing as we explain further in the next sections. This proposed initiative is motivated by barriers to both epistemic insight and flourishing that persist in education and academia because of deeply entrenched practices … developed in earlier times. In a few decades society has been transformed by digital technologies which can store, share, search and increasingly create knowledge at a pace that was unimagined when schools and universities were designed. But at the same time, there are benefits with the systems we currently have – including their familiarity to us. The future of knowledge depends on our ability to recognise and communicate the strengths and weaknesses of what we have and do today while at the same time having a firm grasp of where these new technologies are taking us.

Educators and scholars are deeply engaged in questioning and shaping what the future of knowledge looks like and evaluating what that future means for individuals and society. But for the most part their energies go into the immediate and most pressing demands of the systems they are in. That's why there is value in initiatives, like this one, that work across multiple spaces to galvanise changes that rely on seeing the big picture in tandem with the details.

This proposed initiative will work with stakeholders to co-create new practices in our educational and scholarly institutions aimed at transforming barriers that block epistemic insight and flourishing into opportunities and boundaries that are understood and skilfully negotiated. These barriers include disciplinary silos, the fragmentation of knowledge and our enthusiasm for the ease, speed and benefits of modelling and working with the knowledge we already have.

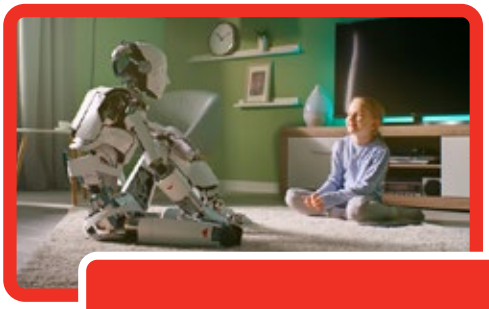
Up until now our work with epistemic insight has mostly focused on school education in England. In this proposal we expand our work in schools to strengthen its international depth and reach. We also add projects which take EI into higher education, science communication and astronomy. Big Questions and real-world problems are in some ways, widely experienced as well as, in other ways, unique to every person. That is why there is value in an initiative like this one which can take a wide view of what knowledge is through a diversity of projects that are designed to work together. Overall, there are six projects in this proposed new initiative, which together address the Big Question, "What is the future of knowledge?"



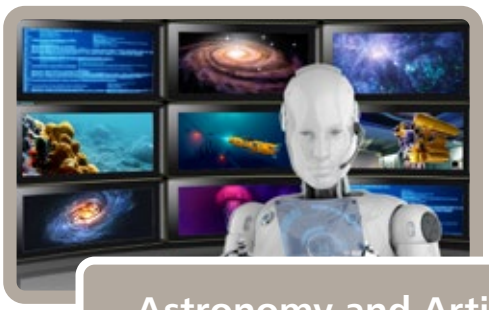
A smarter search engine

Health and wellbeing education in schools

Knowledge Labs



Artificial Friends



Astronomy and Artificial Intelligence: Can a robot be a scientist?

The role of Epistemic Insight for Human Flourishing in Schools

3 THEMES AND RESEARCH QUESTIONS

THEMES

Across the six projects, three themes emerge and are embedded. Their consistency of language across the project descriptions from the first will help us to generate big ideas that reach across the projects as well as analysis and explanations of individual differences.

These themes are:

- What does it mean to be a wise and compassionate epistemic agent in an increasingly digital age?
- How can schools and academic institutions cultivate and teach epistemic curiosity, creativity and criticality – in other words – epistemic insight.
- To what extent can strategies and tools like the 'Discipline Wheel', 'bridging questions', 'research co-creation' and the 'bubble tool' motivate changes to practices in systems where barriers to flourishing are deeply entrenched.

In this section we illustrate where these themes are addressed in the projects.

A SMARTER SEARCH ENGINE

Our first proposed project will develop and test a search engine that aims to encourage curiosity, creativity and criticality about knowledge in school-aged students. The project is motivated by a concern about the impacts of search engines available today on how young people learn to think about and work with knowledge.

> It is difficult to fully imagine a more significant technology when it comes to how technology shapes young people's intellectual character and development. In particular there is a basis to say that popular search engines today emphasise disciplinary silos and increase the visibility of some disciplines, while diminishing the visibility of others. Further we hypothesise that the way that search results are displayed encourages an uncritical acceptance of the fragmentation of knowledge.

Bite-sized fragments of knowledge are used by teachers to 'wow' students at the start of a lesson to help them to engage with a new topic. The astonishing distance to the nearest star beyond our own is a typical example. Our enthusiasm for these sugary treats means an abundant supply on the net.

The fragmentation of knowledge is also used in education to make key facts and ideas more digestible and quicker to learn. But with machines that can store, search and retrieve knowledge at scales and speeds that far outstrip our own capacity, having a headful of facts without contexts doesn't seem to have a lot of value. But it would be hasty to suppose that the best way forward is to forbid the use of search engines in schools. It's not the 'wow' or 'key facts' that are the barriers to the development of epistemic insight – it's how they are presented and the missing steps of what should happen next …

CASE STUDY

Consider using the internet and a search tool to answer the question, "Why is the sky blue?". Searching using a popular search tool produces many, many pages of results with repetitions and rewording of the same physics explanation – with no hint that there could be contributions from other disciplines such as biology, psychology or languages. In the vast majority of cases, the web-page extracts we see on screen do not name 'physics' – and we are missing the story of how we got here. How does this experience compare for a student with the experience of working in a library – where questions and knowledge claims tend to be situated in their disciplines and lots of disciplines are present even if they are not front of mind?

Our preliminary work indicates that existing search engines and the internet can potentially support students with thinking critically about knowledge – and even to think critically about the influences of these digital aids … if students already have a critical question to ask.

In the EI pedagogy, students are encouraged to critically engage with the strengths and weaknesses of a scientific explanation in real world contexts. With the aid of an available search engine, we can extend our original search phrase to 'Why is the sky blue?' and "is it always true"'. Scrolling down the results provides a reminder that skies can also be grey. Students also consider what it means to 'think like a physicist' and what makes a question a good one for physics to address. They use the discipline wheel to consider which if any of the other disciplines they encounter in school could contribute to the answer.

Our initial approach to designing a search engine that stimulates epistemic curiosity and develops epistemic insight will be to draw on the tools and strategies that our previous work created. As such there seems to be a good fit between our proposed project and the recommendations made by the OECD in a paper on the Future of Education and Skills:

> *"As sophisticated machines are used to focus Internet visitors into smaller and smaller subsets based on perceived interests, we fear that serendipity and intellectual courage could be discouraged, and easy questions and answers are encouraged.*
>
> *However, this need not be the case. If instead of narrowing our focus, intelligent machines could be programmed make suggestions that aim to broaden our view, to encourage us to explore alternative ideas, and to challenge our assumptions. As for performance character, machines offer positive and negative possibilities that depend on choices we make with our technology. If we tune the machines properly, it can encourage the flames of curiosity instead of quickly extinguishing them." (OECD, 2018, p. 41).*

KNOWLEDGE LABS

The research methodology we are proposing across this initiative will include gathering and exploring epistemic puzzles that are important considerations in the pursuit of human flourishing. Some of these will also be used as Bridging Questions in our workshops – where our focus on stimulating epistemic creativity and the production of new and valuable epistemic goods makes our projects stand out. For example 'Knowledge labs' is a proposed project for higher education students motivated by a concern that a culture of subject silos in many universities is a barrier to epistemic curiosity, creativity and criticality. The project will investigate the hypothesis that astonishing moments of creativity can be sparked by bringing people from different disciplinary specialisms together to work on a shared problem and/or opportunity (Battaly, 2018).

Preliminary work for this project included a workshop that brought together computer science and Dance students called, "Dance with the Digital: An 'EI' workshop designed to bridge disciplines and spark students' epistemic creativity". The session began by posing the question, 'Can a computer algorithm produce a dance?'.

In the EI pedagogy guide we call this a 'Bridging Question' because it is a question designed to prompt students to investigate and compare how two different disciplines each address the same question (Billingsley and Windsor, 2020). After this starter-activity students were excited about working together on finding and addressing a problem that impacts negatively on human flourishing. The project's outputs will include an Exploratorium of Tik-Tok videos created by participants.

THE ROLE OF EPISTEMIC INSIGHT FOR HUMAN FLOURISHING IN SCHOOLS

For several of our projects the link between EI and flourishing is the argument that in educational settings, an aspiration to bring about human flourishing would include developing young people's epistemic insight. For example, a project called "The Role of Epistemic Insight for Human Flourishing in Schools" is designed to extend the international reach of the work we have carried out in England to co-create whole-school approaches in different schools to developing students' epistemic insight.

The EI pedagogy has been established through research to raise students' academic attainment and university aspirations in England for students associated with disadvantage.

Preliminary work for this new development has tested and established the potential efficacy of the EI curriculum framework for schools in Scotland – a country in the UK with its own national curriculum. Whereas the national curriculum in England puts subjects first, the emphasis in Scotland is on overarching themes such as the development of citizenship (McIvor, 2013).

Thus we hypothesise that in the UK and beyond, the EI curriculum and pedagogy offers a set of learning objectives and well-researched activities for epistemic insight which explain how students can progress from novice to more scholarly ways of thinking. These objectives relate to students' understanding of how science and other disciplines are distinctive and their appreciation of disciplinary strengths and limitations in relation to Big Questions. The EI portfolio currently also provides tools and strategies designed to help students, teachers and tutors navigate the divisions between disciplines in settings where disciplines are mostly kept apart – such as schools and universities in England. This proposed project will expand this portfolio to support a wider range of international contexts.

ARTIFICIAL FRIENDS

Some of the other projects in this proposal take up this opportunity to hypothesise and investigate the value of epistemic insight in a wider vision of human flourishing.

'Artificial Friends' brings together university students with a range of disciplinary specialisms, journalists and computer scientists to explore the Big Question, "How should we respond to loneliness?"

Participants are invited to engage with a series of epistemic puzzles e.g. – "Is loneliness a problem of poor mental health or is it a healthy reaction to being too much alone?" and "What do we mean by an artificial companion? Does it mean an artificial person who can be a companion or a machine that functions in ways that we interpret as friendship?"

These puzzles are explored through workshops that introduce participants to a range of ways to respond to medical and digital technologies that can directly affect our sense of wellbeing and how we make sense of human/spiritual relationships.

Participants will be drawn from different groups, denoting different types of stakeholders. One group will be journalists. Another group will be university students who will represent both future professionals with different scholarly expertise and also potential end-users. We are confident on the basis of research so far that bringing these puzzles to the surface and exploring them in collaboration with stakeholders creates a stimulating space for dialogue and leads to new developments in the creation and study of knowledge, improvements in digital transparency, and the creation of innovative solutions to real-world problems.

HEALTH AND WELLBEING EDUCATION IN SCHOOLS

One project is concerned with the impacts of school life on students' health and wellbeing – now and in the future. It attempts to bring together the roles of a school in equipping young people for their future lives as adults and providing a space in which students, teachers and other people work and study now. The constructs of epistemic insight and flourishing are both useful here as are case studies that expose and explore puzzles like the scenario of a lunchtime biology exam revision class that reduces the time available for lunch.

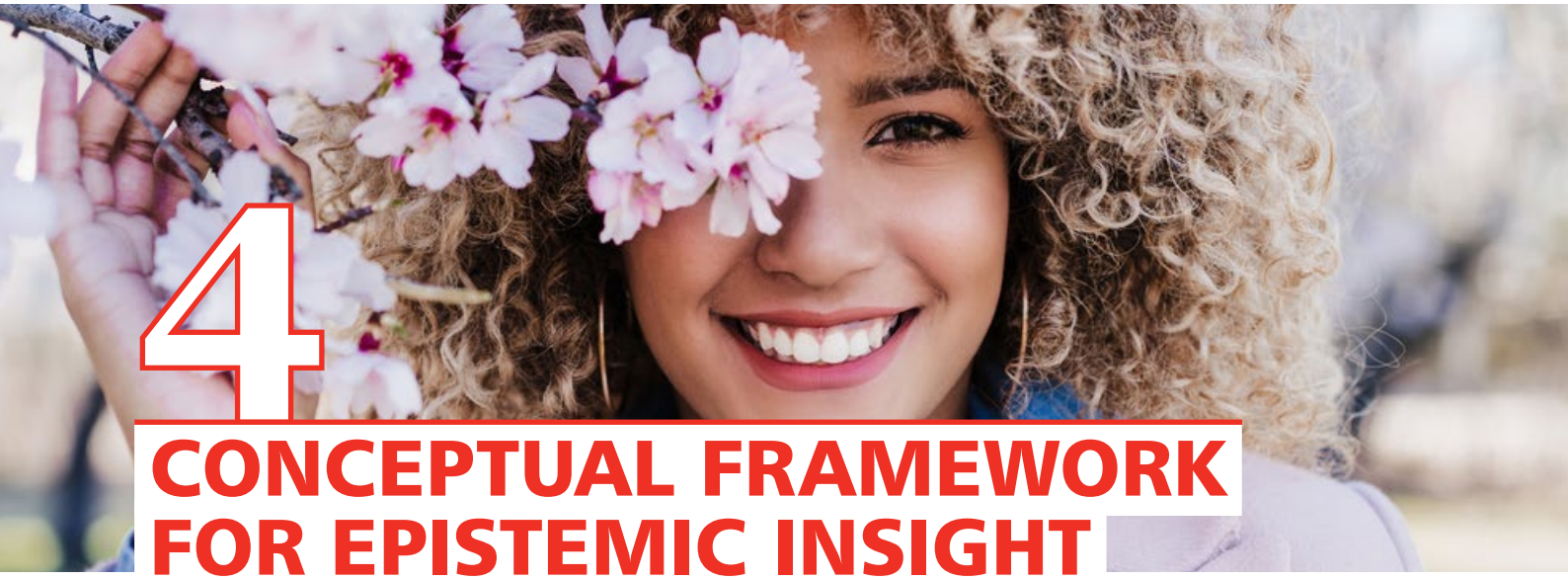
RESEARCH QUESTIONS

Via the six projects in the proposed initiative we will explore our three themes through a range of research questions

- How can teachers, tutors and AI developers make knowledge meaningful - when students can go to the internet whenever they have a question?
- What are the principles and practices of a joined-up approach to health and wellbeing education in schools?
- Can sessions in higher education that bring students in the sciences and humanities together empower and equip students as epistemic agents to act in ways that promote and cultivate flourishing? e.g. do they gain new insights and produce new epistemic goods?
- 'Artificial Friends': How should individuals and society to respond to loneliness? A case study that works with UNESCO's definition of flourishing to explore this question in the university context.
- Can a robot be a scientist? What does and should it mean to work scientifically when astronomers are collaborating with AI?
- What strategies help teachers and researchers internationally to co-create and test pedagogies and tools that develop young people's understanding of how knowledge works?

OUTPUTS

- A special edition of the journal, Science and Education, called, Epistemic Insight: What is the future of knowledge?
- Additional outputs associated with individual projects



4 CONCEPTUAL FRAMEWORK FOR EPISTEMIC INSIGHT AND HUMAN FLOURISHING

To quote from a research paper on Flourishing and Education published by UNESCO and authored by De Ruyter, Oades, and Waghid (2020, p. 2), human flourishing has two parts:

1. "OPTIMAL CONTINUING DEVELOPMENT OF POTENTIAL" - via which individuals and society change now in order to flourish in future.
2. "LIVING WELL IN AN ENABLING ENVIRONMENT"- whereby individuals are engaged in meaningful relationships and activities i.e. aligned with both their own values and humanistic values, in a way that is satisfying to them. Preconditions for living well include good mental and physical health and being respected and living in a healthy environment.

This framing of human flourishing recognises that schools and universities have responsibilities and concerns that relate to the wellbeing of students, teachers and tutors and also to identifying and pursuing strategies to help with optimising their development. In setting up these aims, UNESCO's definition also sets up the possibility that these two aspects of flourishing can be in tension. Having access to that possibility means that this definition can facilitate the investigation of a case study where some people argue that stresses experienced by students, teachers, tutors and/or professional scholars are justified by the realisation of individual, local or societal rewards later. The authors also explain that different people have different potentials, different levels of potentials and different optimal journeys of development.

In considering the relationship between epistemic insight and the notion of flourishing we encounter the immediate difficulty of bringing together two fluid and highly adaptable concepts with all the issues of vocabulary and grammar that this entails.

WHY EPISTEMIC INSIGHT IS IMPORTANT IN A BROADER ASPIRATION OF HUMAN FLOURISHING

We make certain presumptions here, most notably that both epistemic insight and human flourishing are positive concepts. The first provides the opportunity for encounter with knowledge in a dynamic way that develops thinking about the nature of knowledge itself and is accessible to all regardless of scholarly achievement. The second, flourishing, relates to wellbeing and realisation of potential in each person at each stage of life. Both, then, are concerned with the human good. Epistemic insight is thus a desirable thing in and of itself, facilitating encounter with the world and the stock of human knowledge in a critical and creative way. We have demonstrated this through significant research with young people in educational settings and its application in scholarly activity. As such while the research proposed here seeks to investigate EI's potential contribution to the understanding, and promotion, of human flourishing, this is not to diminish the intrinsic value of EI but to recognise its value within the development of other goods.

It is here then that we find a key point of encounter between EI and flourishing. For genuine human flourishing, realised at the particular level of the individual it is difficult, if not impossible, for this to be achieved if access to epistemic knowledge, and encouragement to be curious, creative and critically engaged with knowledge, is blocked or withheld. For projects in our proposal, we make use of this point of encounter by saying that when participants gain in epistemic insight, they also build their own and society's potential to flourish. In other words, for participants and society more widely, access to the understanding of EI will facilitate flourishing through provision of insight and skills that enable knowledge to be questioned, created and used to its full potential in the particular context of real human lives lived well.

For several of our projects the link between EI and flourishing is the argument that in educational settings, an aspiration to bring about human flourishing would include developing young people's epistemic insight. Taking up this opportunity, these new projects will take these ideas and tools into new spaces and contexts where we will collaborate with stakeholders to understand their value and where appropriate, co-create new ideas and tools.

As we noted before, the concept and definition of flourishing has two parts. The first part concerns the optimal development of potential. This aspect of flourishing resonates with the aims of the EI curriculum and pedagogy. We have explained that the EI vision and theory of change focuses on what happens when individuals and communities become more knowing about the epistemic borders that operate in in their lives and more confident in navigating them.

EXPANDING OUR CONCEPTUAL FRAMEWORK TO ENCOMPASS MORE ASPECTS OF FLOURISHING

In this section we explain the conceptual framework for projects in our proposal that engage with the second part of UNESCO's definition of human flourishing. As this has not been addressed in our work so far, in this section we develop our conceptual framework to consider these areas too. Adding these new frames of reference to the research will strengthen the scope and usefulness of the work so far.

The tools and resources we create for this new initiative will mean that our research can engage with and (we hope) help to clarify real-world problems where it becomes important to be epistemically insightful when making difficult decisions that relate to wellbeing and to having meaningful human/spiritual relationships.

As a knowledge driven society, it is important that developers of medical and digital technologies, journalists and end users have epistemic tools to help them to engage critically with the big picture of what are likely to be the impacts of a new technology – beyond those that are of immediate interest. Consider for example an announcement by the media that scientists are working on a 'pill for love' which changes how you feel about an unhappy relationship. What standards of transparency should apply to scientists, technologists and anyone else involved in creating the technology? Should doctors consider the option of prescribing this pill and/or being ready to discuss it with patients? What should journalists and the wider public be expected to already understand about how a 'pill for love' might work in order to evaluate it critically against aspects of personhood and the nature of reality that matter to them? These questions are interdependent and they also illustrate how, in our research, workshops that develop epistemic insight can expose and help to overcome situations where people might otherwise be misled, with the negative consequences that this would have on the extent to which individuals and their families flourish.

Technologies like AI can be significant forces for good in flourishing if the ways that they work are transparent to those who might use them. In other words if we are to reduce the risk of avoidable harms, it is essential that explanations about how technologies work and their strengths and limitations are transparent and that media reports avoid deliberate or unintended sensationalism. That is a further reason to say that human flourishing and the development of epistemic insight are pertinent, critical and mutually supporting concerns in a wide variety of settings.

Towards instruments to assess gains in epistemic insight and flourishing

We propose to look for gains in flourishing in ways that retain and build on the instruments we have already established.

- Using the tools we have established, we can look for gains deemed valuable in education – where participants gain epistemic insight and openness to asking Big Questions as a way to help them to become wise and compassionate epistemic agents. For studies that extend over time, we can also look for evidence of changes in students' attainment and academic aspirations.
- We can also look for gains deemed valuable in health and wellbeing education and in healthcare. Indicators are where participants report a greater sense of wellness and build their capacities to make good decisions now and in future about their own and other people's wellbeing. For studies that extend over time, we can also look for objective evidence of changes in participants' health and wellbeing.
- We can look for gains deemed valuable in spiritual/social relationships care and education. Indicators are where participants report a greater sense of having meaningful relationships and build their capacities to make meaningful spiritual/human relationships now and in future. For studies that extend over time, we can also look for objective evidence of positive impacts on participants' spiritual/social relationships.

5 ABOUT EPISTEMIC INSIGHT AND LASAR

Epistemic insight is embedded into our conceptual Framework across all the projects and we say more about it here.

Epistemic insight is a construct that was developed for use in education. The vision that underwrote its construction is that education can and should help students to become wise and compassionate epistemic agents. We devise workshops and whole school strategies that help learners engage with Big Questions and real-world problems that are in some ways, widely experienced as well as, in other ways, unique to every person. The EI curriculum framework and teaching resources give clarity to what progression looks like, on the journey towards becoming more scholarly and more epistemically insightful. It says for example that students will advance in their understanding that and why some questions are more amenable to science than others. This overcomes an anxiety commonly expressed by teachers and learners that sessions which explore Big Questions spend too much lesson time on amorphous discussion and that the objectives are seldom clear. To look for gains in students' epistemic insight we have instruments that probe students' 'knowledge about knowledge' and their attitudes towards asking and exploring Big Questions in their education settings. Our interest here stems from research which shows that opportunities to ask and explore Big Questions are frequently blocked by how education works. The EI guidebooks for teachers explain ways to address and overcome these barriers.

> "Focusing on epistemic insight … engenders a pragmatic approach to helping students to make better sense of the messages they receive in different subjects about scholarship and how claims are tested" (Billingsley and Hardman 2018).

The learning journey which the EI pedagogy supports includes the idea that when we engage with Big Questions and real-world problems we may encounter two ideas that seem to be in competition and yet in different ways, both seem to have some kind of value and make some kind of sense. Our interest in this type of puzzle came from reviewing scholarly publications about the relationships between science and religion. This vast area of scholarship contains what are arguably paradigmatic examples of how to clarify and examine the relationships between two distinctive and yet overlapping ways of knowing. We noted that when it is operating effectively, this dialogue includes a kind of skilful and insightful navigation of questions about epistemic boundaries.

We noted too the importance of dialogue and the epistemic goods that can emerge. This is where our interest in epistemic insight began and is foundational to what we mean by the term. In developing what this dialogue would look like in our resources and pedagogy, we discussed with our Advisors how to explain that there is a range of views about how science and religion relate in scholarship and how to avoid putting one view on a pedestal. We agreed on the learning objective that students should appreciate that "science and religion are not necessarily incompatible." Other learning objectives in the journey include appreciating that "some questions are more amenable to science than others."

ABOUT LASAR

Director: **Professor Berry Billingsley**,
Professor in Science Education, Canterbury Christ Church University

The LASAR (Learning about Science and Religion) Research Centre aims to help students (broadly conceived), parents/carers, educators, communicators and the wider public to engage with Big Questions that bridge science, religion and the wider humanities. We design and test resources, structures and activities that encourage interest in Big Questions and foster epistemic curiosity, creativity and critical thinking about the nature, application and communication of knowledge.

LASAR has developed a research network consisting of a consortium of universities and educational institutions. We plan to continue to create a research community where research expertise and experience is developed and shared within the Centre, the faculty and wider academic community. Our partners help us to discover new contexts for our existing findings and new questions to explore. This includes creating projects designed to increase the diversity and number of students who study STEM subjects.

Our schools partnerships and outreach work is led by Finn Lawson and is central to our aims and portfolio. 'Inspiring Minds' is the university's flagship outreach project and is underwritten by an EI pedagogy, focusing on Big Questions and knowledge about knowledge. Inspiring Minds holds a national Neon award which recognises its positive impacts on school students' academic attainment and aspirations. It is organised in collaboration with the Outreach team and targets the most deserving students by postcode.

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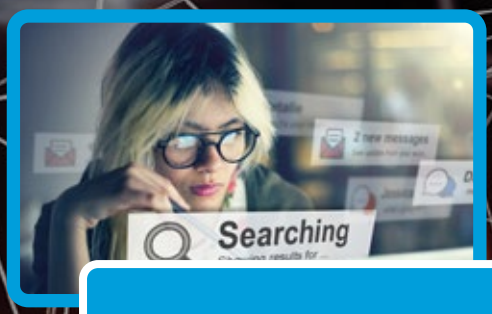
Epistemic Insight

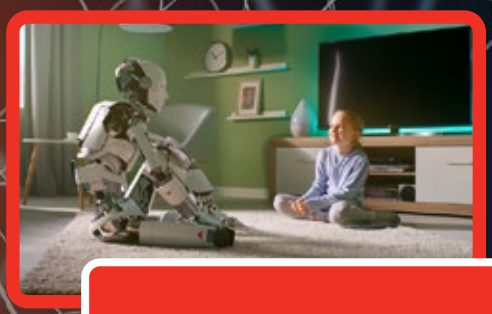
THE SIX PROJECTS



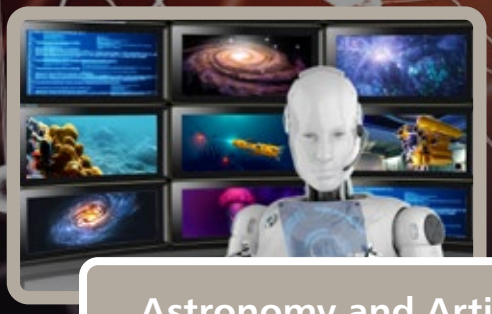
A smarter search engine

Health and wellbeing education in schools

Knowledge Labs



Artificial Friends



Astronomy and Artificial Intelligence: Can a robot be a scientist?

The role of Epistemic Insight for Human Flourishing in Schools

Canterbury Christ Church University