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Research Methods Workshop

What is Research (Part 1 of 2)

Trawsnewid Addysg; Trawsnewid Bywydau
Transforming Education; Transforming Lives



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MBA / Postgraduate Level Research **Intention**

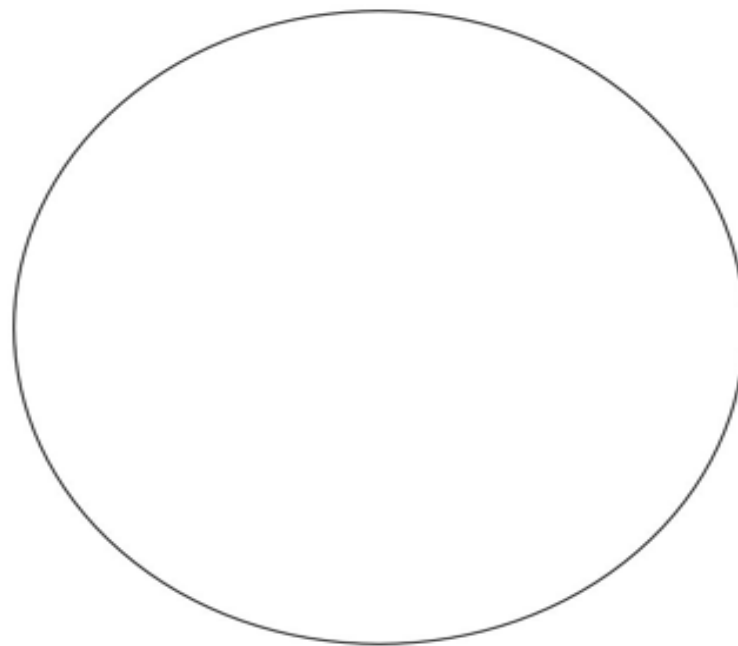
Could be to:

- 1) solve specific problem – **if so which / what problem?**
- 2) exploit an opportunity – **if so what opportunity & where??**
- 3) respond to a pressure / demand - **if so whose pressure & demand?**
- 4) help gain Competitive advantage – **if so how and why? i**

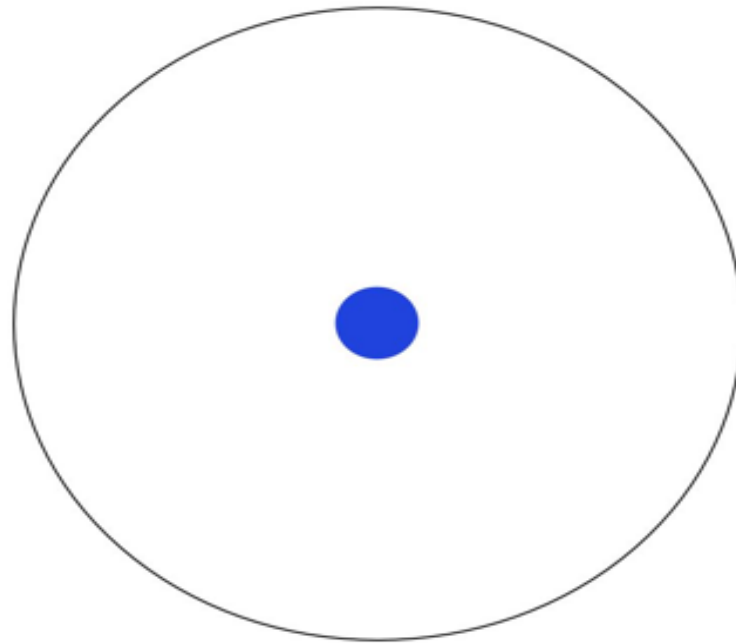
But what is research & what is not research?

1. What research is
2. What research is not
3. Research versus consultancy
4. The consultancy process
5. The structure of research
6. The research process
7. What researchers should do and be

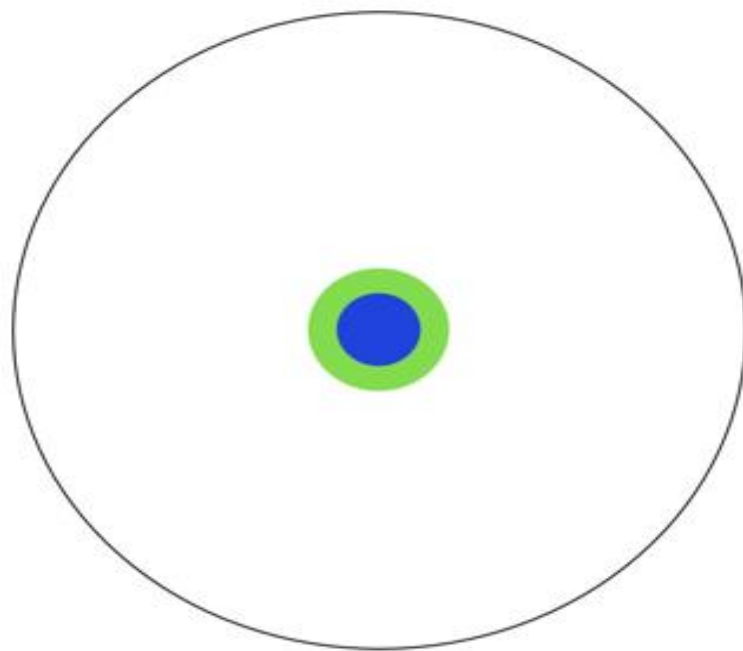
Imagine a circle that contains all of human knowledge



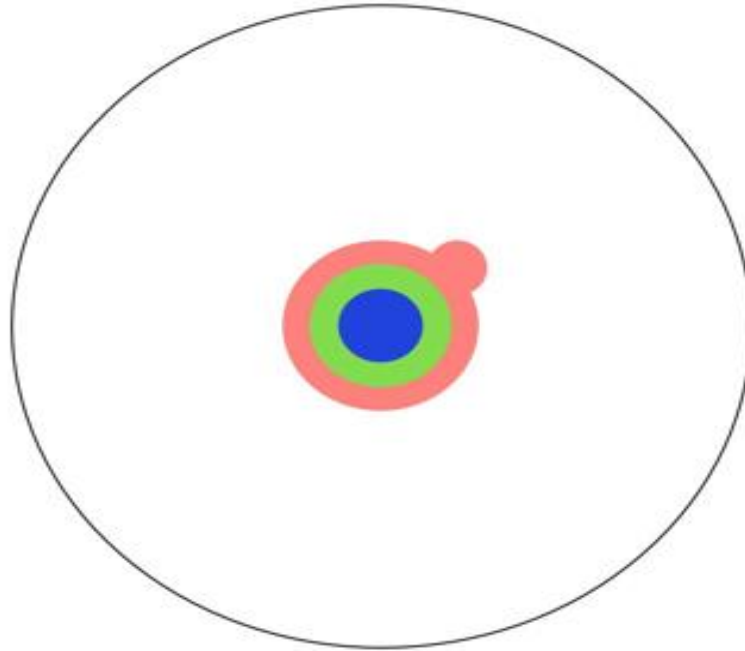
**By the time we finish elementary
school, we know a little**



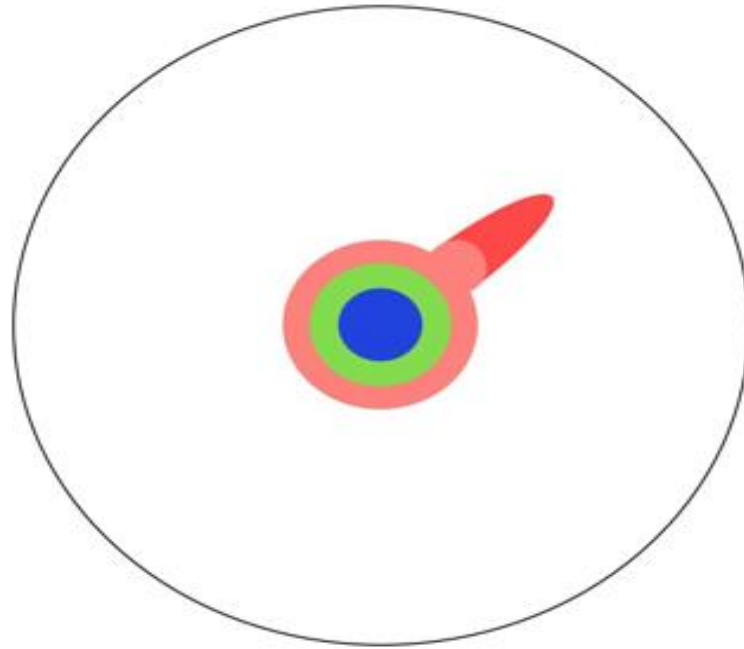
By the time we finish secondary school, we know a bit more



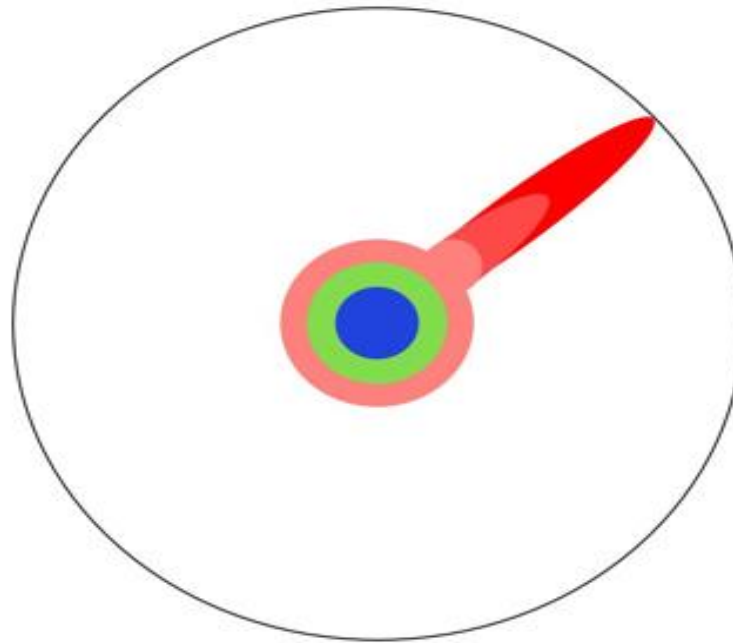
With a bachelor's degree, we gain a specialty



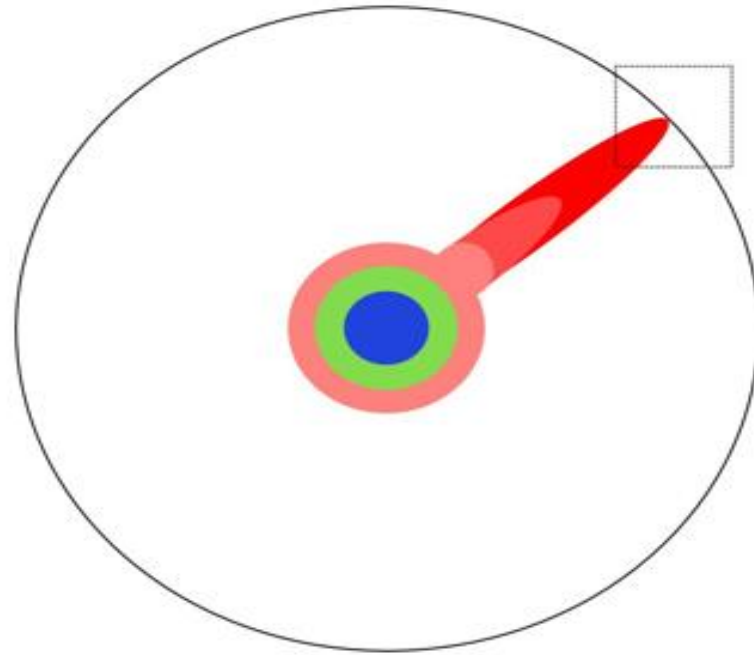
Master's degree deepens that specialty



Reading research papers takes us to the edge of human knowledge



Once we are at the boundary, we focus!



We then start our own RESEARCH

BUT

What is research?

Research is all about:

- 1) the systematic investigation into and study of materials, sources, etc, in order to establish facts and reach new conclusions.
- 2) an endeavour to discover new or collate old facts etc... by the scientific study of a subject or by a course of critical investigation.

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What is research?

- Research is what we do when we have a question or a problem we want to resolve
- We may already think we know the answer to our question already
- We may think the answer is obvious, common sense even
- But until we have subjected our problem to rigorous scientific scrutiny, our 'knowledge' remains little more than guesswork or at best, intuition.

What is research?

- First priority is to formulate your question
- Then figure out how you are going to answer it
 - How have others answered it?
 - How does your proposal fit in with what others have done?
 - How will you know when you have answered it?
- Then you can present your answer

Classical scientific method

- Observation of some phenomenon
 - Maybe systematic, occasional or accidental
- Some idea of an explanation (hypothesis)
 - Induction, conjecture, intuition, guesswork
 - Usually informed by related work
- Testing of the hypothesis
 - Test and revision cycle

Hypothesis

- Probability of research
 - Nothing is certain
 - *The exception that “proves” the rule*
 - Scientific “truth” is actually usually a statement of what is most probable given the currently known data ...
 - ... within the given framework
- Statistical techniques try to help us show extent to which our results really do support the hypothesis

Hypothesis

- A hypothesis makes a prediction of the expected outcome in a given situation
- Usually: how the manipulation of the **independent variable** will influence the behaviour of a **dependent variable**
- The hypothesis is tested in an **experiment**
- Experimental design ensures that what you are doing is genuinely (and solely) responsible for the results
- **Extraneous variables** have to be **controlled**

Experiment

- If the experiment works, the hypothesis is shown to be probably correct
 - Can't prove 100% truth
- If it fails, it could be because
 - The hypothesis is wrong
 - The experimental design is faulty

Null hypothesis

- Experiments are generally set up to demonstrate or support (rarely “prove” , note) a hypothesis
- The **null hypothesis** H_0 is that any observed changes in behaviour are due to chance
- The **alternate hypothesis** H_1 is the hypothesis you are trying to demonstrate
- Usually, the best you can do is refute H_0 thus showing that H_1 is probably correct (with a measurable degree of likelihood: **statistical significance**)

Where do hypotheses come from?

- Not usually thin air
- From within a **framework**
 - Some phenomenon is not well explained by current thinking
 - “New” hypothesis is often just an adaptation of an existing hypothesis
- thesis ~ antithesis ~ synthesis

thesis ~ antithesis ~ synthesis

- Thesis
 - the original statement of an idea
- Antithesis
 - an argument to challenge a previous thesis
 - often draws on new data
- Synthesis
 - a new argument from existing sources
 - typically, resolves the *apparent* contradiction between a thesis and an antithesis

Testability

- A good hypothesis is testable
 - Not provable, in the sense of “shown to be true” (true = certain)
 - Refutation of a thesis by proving that it is false is a cornerstone of modern science
 - Simply refuting a hypothesis is OK but better science will **explain** why hypothesis is wrong, and (better still) **offer an alternative** hypothesis

One-/two-tailed hypotheses

- Our experimental design may make either
 - a strong prediction about the behaviour we expect to observe:
 - our manipulation of the independent variable will cause a **specific change** in the dependent variable
 - a prediction about a range of behaviours we expect to observe, typically perhaps two
- One-tailed hypothesis: statistical significance means expected result was found
- Two-tailed hypothesis: only need to show that the different results are statistically significant

Variables

- The experiment measures the “behaviour” of the dependent variable
- DV must be **operationalised**
 - Some aspect of the DV must be measurable
 - What to measure?
 - How to measure it?
 - Are you really measuring what you think you are measuring?

Quantitative vs Qualitative

- Quantitative research
 - systematically observe changes in the phenomena of interest while manipulating what are believed to be causal influences
- **Qualitative research**
 - **Is more concerned with the individual's personal experiences of the problem under study**

“Proof” by demonstration

- Intuitive alternative to the classical scientific method:
 - Build something specific and then claim that it can be seen as an example of a more general class of solutions
- High risk
 - difficult to demonstrate generalisability
 - in fact doing so entails making an *a posteriori* hypothesis
 - What can you say if it goes wrong ?
- So you still need a theoretical basis

Planning

- Statement of the problem
- Literature review
- Choice of research method
- Design of study
- Data collection
- Analysis of data
- Write-up