The following is a list of definitions and explanations of key concepts in research. It is by default limited and partial; research covers a huge field. Some of the concepts and ideas are quite philosophical and may challenge our own perceptions. Furthermore, many concepts that are used in research are fiercely debated and people often side to one or other interpretations. Disagreement sometimes ensues over what seem to be fundamental concepts and people may take an, almost, combative stance. From a personal perspective, I think it is useful for researchers to be open to different ideas and interpretations of what they do. It seems less likely that false assumptions are made with a breadth of understanding. Plus from a pedagogic view as academics it is important that as supervisors of future researchers we are able to communicate a range of approaches that may or may not be useful in certain research contexts. Lastly be aware of one's own research orientation make it easier to defend ones research because one I becomes more aware of the possible limitations and strengths of the approach in relation to investigating a particular type of research question.

Ontology

Ontology is at the level of belief. For example the belief in a supreme being that provides the ultimate explanation for the world and our being; the dualist conception of the world as an interplay between Yin and Yang; the Descartian i.e. Cartesian view of mind, body and God is ontological. Often explanations of epistemology and ontology overlap. Positivism could be presented as an ontology or an epistemology. The implication that there is an external reality is in a sense ontological. This tends to lead to the desire to break down, define, and calculate component parts of that reality in a way that is seen to be robust and generalizable.

The belief that underpins forms of phenomenology that accepts that there is not separation between us and the world around us, we are but one connected whole each a part of and influences the other through our relationships with phenomena, is in a sense an otology. The latter has epistemological and methodological implications placing great emphasis on understanding people's perceptions of their experience.

Epistemology

Epistemology "is the study of knowledge and justified belief. It questions what knowledge is and how it can be acquired, and the extent to which knowledge pertinent to any given subject or entity can be acquired."
https://en.wikipedia.org/wiki/Epistemology

Positivism or interpretivism are therefore epistemologies that have different beliefs about what we can know, for example see positivism or social constructivism. Post positivists tend to move away from the notion of a clearly definable objective reality to an acceptance of one that is again objective but may be opaque due to the limitations of our senses.

Epistemologies have implications for how we find out and the kind of data we gather and what we think we can claim based on that data.

Methodology

There is often confusion between methodology and method or technique. Here the methodology is considered to be chosen approach that frames our explanations, a theoretical orientation. Whereas methods and treated as synonymous to techniques. Confusingly the methodology chapter in a PhD thesis can encompass ontology, epistemology, methodology and the techniques that the researcher intends to use. Within epistemology there are various sub-epistemologies, types of epistemology such as grounded theory. These could be considered to be explanatory frameworks, for example, theories that underpin explanations of the body, climate, geology, engineering etc. Methodology refers to the underlying epistemological beliefs of the researcher; the ideas that frame their research. For example, social constructivism assumes that people construct a shared reality through interaction, communication and language. Hence, techniques tends to focus on collecting narratives.

Research techniques

Research techniques stem from the epistemology but can be used within a variety of epistemological approaches. Distinctions however will be made as to what that data can tell us (epistemologically). This will also lead to different approaches as to how to analyse and report that data. Examples of techniques are interviews or surveys or participant observation etc. The list is long. Different techniques have evolved to help with different types of enquiry; randomised controlled trials for testing hypotheses; participative techniques enabling community participation in research etc.

Participative research

Participative research 'is a partnership approach to research that equitably involves, for example, community members, organizational representatives, and researchers in all aspects of the research process and in which all partners contribute expertise and share decision making and ownership https://en.wikipedia.org/wiki/Community-based_participatory_research

Participative approaches are encompassed in a number of methodologies: community-based participatory research; participatory and action research; participatory action and learning and owe to a great extent there origin to others (although they may influence each other) such as action research; participatory rural appraisal and rapid rural appraisal.

Participative research tends to be underpinned by interpretivist epistemologies, for example the social constructivist approach. They may also favour a phenomenological ontology and epistemology where people's experience is to some extent unique and there is an emphasis, therefore, collecting people's perceptions of their experience rather than placing more emphasis on explanations and

categorisations that stem from outside the community from, for example, the researcher.

Citizen-led research

Citizen-led research is where the community, the people who are experiencing a problem or issue, take it on themselves to try to understand the problem and find ways that it could be addressed. It is therefore highly 'participative'. They therefore frame the research question, determine how to explore the problem, conduct the study and use and communicate the findings and their conclusion. In practice the majority of research is instigated from outside the community who experience the 'problem' and there are varying degree of participation from the citizen. One outcome can be for the researcher to share their knowledge about doing research and act as a coach or facilitator.

Researcher-led research

Researcher-led refers to research where the research agenda, questions, epistemology and research techniques tend to be defined by the research rather than the community or citizens who are the focus of the research. This tends to be associated with a more positivist or post-positivist orientation. Hence the desire is to understand, often to quantify and seek generalisations that can be applied across a community or beyond to other contexts.

Research-led may be quantitative in orientation or qualitative but the underlying assumptions about validity, transferability will be governed by the underlying epistemology and ontology.

Community-based research

See definition of participative research. Community-based implies that the community are engaged in the research. The degree to which they are involved will vary depending on how participative the approach. This could vary from being surveyed, to seeing the results of that survey, to being consulted on the research, to actively playing a role in who that research could be conducted, to conducting the research, to deciding on what research should be done and managing that research.

Positivism

Positivism stems from a belief that there is an objective, definable, external reality, that all things are measureable, that these will remain true and probably be generalised. This mode of thinking tends to be particularly applicable to the material world and has enabled the progress of science. However, even in the mainstream scientific these assumptions are to a certain extent being questioned partly through the influence of quantum mechanics, complexity theory and chaos theory that imply a degree of relativity. Positivism has therefore been questioned as an approach, hence post-positivism and particularly in relation to the study of living systems.

Nevertheless what tends to be the reductionist nature of positivism has great value in explaining situations or phenomena where variables or factors can be defined and to some extent controlled. These lend themselves to experimental situations where hypotheses are precisely defined and outcomes rigorously validated, often through the use of statistics.

Interpretivism

There are various degrees of and epistemologies associated with interpretivism. The fundamental assumption is that we do not have direct relationship with a clearly definable, objective, reality and that there is always a degree of interpretation due to the limitations of our senses (although these can be 'magnified' through various tools such telescopes and microscopes). The degree to which the interpretivist frame is taken varies. Critical realists for example assume an objective reality but that it is clouded and the exploration of 'power' leads to useful explanations. Grounded theorists assumes that theory can be generated from a rigorous elicitation of people thoughts and that this theory can be generalised but is faithful to people's experience because insights have been generated in an inductive, bottom-up way. Phenomenologists again sit on a continuum at one extreme that we only have perceptions of experience, that we are intimately connected or even combined with and a part of the world. They therefore place great emphasis on capturing people perceptions and awareness of phenomena.

Wicked problems

'The problem is difficult to define. Many possible explanations may exist. Individuals perceive the issue differently. Depending on the explanation, the solution takes on a different form.' http://www.odi.org/comment/8801-wicked-problems-development-aid-complexity-ramalingam

Wicked problems share the characteristics of Open problems https://en.wikipedia.org/wiki/Open_problem

Generally wicked and open problems are the result of multiple factors and it is often hard to identify the range of factors that may influence the situation or for that matter identify the solution(s) which may be entwined and interdependent. A great deal of problems in society conform to this kind of situation.

Often a systems approach or a holistic approach may be taken to a wicked problem i.e. seeing the situation as a system with a number of interacting variables or factors or inputs and outputs where qualities may emergent.

Tame problems

'The problem can be clearly written down. The problem can be stated as a gap between what is and what ought to be. There is easy agreement about the problem definition.' http://www.odi.org/comment/8801-wicked-problems-development-aid-

complexity-ramalingam. Tame problems therefore favour analytical thinking, where problems can be broken down and reduced to key variable/factors.

Tame problems are not necessarily simple problems. They can be extremely difficult problems to understand and resolve.

Tame problems share the characteristics of Closed problems where there is an expectation that there is, possibly, one answer or a reasonably well defined set of answers.

Convergent thinking

Convergent thinking a term that tends to be used in the educational context shares similar characteristics associated with dealing with 'tame' problems and maybe underpinned by positivist orientations. Convergent thinking is associated with learning style and particular types of brain activity. See https://en.wikipedia.org/wiki/Convergent_thinking

Divergent thinking

Divergent thinking shares similar qualities to thinking associated with 'wicked' problems, assumes an openness to various interpretations and answers. IN the educational context this is associated with certain types of learning style and cognitive activity.

Systems thinking

System thinking is where phenomena are considered as a whole i.e. holistically, where the whole is not just a sum of its parts but is a single operating system. Systems thinking is associated with 'living systems' and autopoiesis (see https://en.wikipedia.org/wiki/Autopoiesis). Emphasis is placed on connectedness within the system, relationships and context. There are many forms or contributors to systems thinking, (see https://en.wikiquote.org/wiki/Systems_thinking) . Systems thinking has influenced many disciplines such as software development, architecture and design, urban planning, organisational planning, public health, environmental studies, climatic studies etc.

Critical thinking, information literacy, information capabilities

Critical thinking implies the reflective, critical approach to dealing with and handling information (see http://www.criticalthinking.org/pages/defining-critical-thinking/766). This shares characteristics with information literacy which implies the systematic and critical behaviour, habits, norms and attitudes relating to the: effective and efficient access and evaluation of information sources (often also called media literacy or in library and information science as location and access or information retrieval), the critical evaluation of information and the processing, management and use of information as well as the communication of information. The latter draws on

communication studies and choosing the most effective way to enable different people to access and engage with the information (that stems from research). The word information is here used synonymously with the words data and knowledge. In higher education this critical thinking and information literacy are associated with academic literacy – although these focus on those that are particularly relevant to the higher education context, for example, essay or research proposal writing or avoiding the challenges of plagiarism.

Information capabilities tends to refer to those cognitive, emotional and behavioural capabilities associated with information literacy.

Qualitative research

Qualitative research seeks to explore and understand the nature or essence of a situation. This tends to driven by an interpretivist orientation but not necessarily it could be part of a positivist/post-positivist research and will often be used to develop research techniques that would indicate whether or not the findings can be generalised across a community or people in general. Qualitative research in itself tends to not assume generalisability beyond the specifics of a case.

Qualitative data is derived through qualitative research and tends to include people's thoughts or statements. Qualitative data is analysed thematically to identify patterns, common themes, generally through a process of coding (which tends to be inductive but could be deductive depending on the epistemological orientation of the researcher).

Quantitative research explicitly seeks to generalise and define truths that can be applied across the community or even beyond, assuming that data collection has conformed to sampling that is considered to be statistically representative of the total community. Quantitative data may be gathered through various techniques including surveys or observation.

However, quantitative data is often supported by qualitative data that helps explain quantitative data, for example, people may be asked why they behave in a particular way (which has been quantified).

Qualitative and quantitative research

Increasingly the boundaries between qualitative and quantitative research are blurred. Qualitative researchers may use quantification to indicate patterns in their data.

Participative research increasingly involves participative statistics where people in the community quantify their own research data. However, participative research may focus on a particular context or community or relatively small numbers of participant and tends to conform to the characteristics of qualitative research,

although even here effort is made to be inclusive and hence involve the range of stakeholders in the community, implying a representativeness.

References (this list will expand during R1, R2 and R3)

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https://www.kumu.io/philippg/holistic-information-science#holistic-information-science-for-systemic-research-excellence

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