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Theories, theoretical and conceptual frameworks, models and constructs: Limiting research outcomes through misconceptions and misunderstandings

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Abstract

Contributing to knowledge or theory is generally a standard requirement for research and doctoral studies. Whether that contribution should be from a research, policy or practice perspective is often not specifically stated as a requirement, yet one or all are certainly possible. A doctoral study (or indeed any research study) is usually quite firmly cast or framed within a form of theoretical or conceptual framework. Yet, even the definition, selection and formulation of a framework that is appropriate and that can inform a study throughout its various phases and stages is sometimes considered a ‘doctoral or research challenge’ in itself. This paper will argue that the way models, frameworks or theories - all of which in this current paper are collectively termed underpinnings - are conceived and used could well determine whether, how and to what extent a thesis or research study might contribute to a wider knowledge base. The paper offers a theoretical strategic analysis of the issue. It will explore what a conceptual or theoretical framework for a doctoral or wider research study is, what role or roles it can take, and whether, how and to what extent a study might contribute to knowledge or theory. The paper will conclude with ways to question approaches to roles of conceptual or theoretical underpinnings that do not limit the potential of a thesis or study to contribute to theory.

1. Introduction

This initial section asks what a conceptual or theoretical framework for a research study might be. The ways that universities define a doctoral study's contribution to knowledge or theory can vary quite widely. The United Kingdom (UK) Quality Assurance Agency (2014, p.30) states that a student for a doctoral degree should demonstrate "the creation and interpretation of new knowledge, through original research or other advanced scholarship... at the forefront of an academic discipline or area of professional practice". This statement clearly supports new knowledge contribution that could be in professional or policy fields as well as in the research field. It is not surprising then, perhaps, that different universities might state different requirements in this respect. For example, in the UK, Lancaster University's regulations for a doctoral thesis state that, "A successful candidate for the degree of PhD shall show convincing evidence of the capacity to pursue scholarly research or scholarship in his or her field of study... The results of this research shall then be embodied in a thesis which makes an original contribution to knowledge" (Lancaster University, 2018, p.3). However, a much more detailed description is given by Manchester Metropolitan University, UK, stating that, "Doctorates are awarded for creating, interpreting and communicating knowledge that extends the forefront of a discipline or of professional practice, through original research and critical thinking" (Manchester Metropolitan University, 2019, n.p.). It is clear from these different statements that the latter institution is clearly supporting a focus of developing knowledge that can be research, policy or practice focused. From a theoretical or conceptual perspective, this means that the underpinning in the latter case might be founded on a conception, framework or model that could be policy or practice based, rather than it necessarily being research based.

Underpinnings (a term used throughout this paper to collectively include models, frameworks and theories) for research can take a number of different forms. Indeed, distinctions between different forms of underpinnings might provide a quite different conceptual or theoretical basis for a study – if differences between models, conceptual frameworks, theoretical frameworks or theories are considered (Grant & Osanloo, 2014). These different forms of underpinnings can all arise from previous published research, but they can arise from and have quite different contextual bases. In general, the contexts of the four different forms arising from previous studies that are described in the research literature can be outlined (Passey, 2019), and will be defined in the remainder of this paper, as:

- a model holds for a given case or stated population, arising from context-specific research, often indicating main features of influence or contribution;
- a conceptual framework tends to be more flexible and descriptive, as it usually identifies factors or criteria that have influence on a particular field within the more major features, which might be, for example, social learning, discovery learning, or experiential learning;
- a theoretical framework arises from outcomes beyond a single study, based on one or more theories, which might be, for example, social constructivism, constructionism, or behaviourism; while
- a theory considers a broader and deeper concern or context, suggesting the detail of what might be more general, beyond one or a number of contexts.

This distinction between different forms of underpinnings is fundamentally important, as it can determine the applicability of any choice of underpinning to a specific study. For example, if a model has been developed from research in one context, then whether it could be applied in another different context is in itself a significant question. Additionally, if a model is gained from a limited context and range of participants, whether using such a model as it stands would then limit the findings of another piece of research just to the major features of influence that have been identified is another notable question. These concerns form some of the basis of the debate that has arisen when thinking about approaches that might be taken with case study research, where the focus is on a real-life context, where the "case will be complex and bounded... with the analysis undertaken seeking to be holistic" (Tight, 2017, p.17). Considering whether outcomes from those cases have potential or wider applicability, and how any wider generalisation might be viewed and gained, can be a key question. Indeed, in the context where a model from a single case is used, where only major features of influence are identified, there is the question of whether taking an alternative grounded theory approach, defined as "a general abstract theory of a process, action or interaction grounded in the views of the participants in a study" (Creswell, 2009, p.243), might not release opportunity that would not be offered when using an existing model. Indeed, this concern might also similarly apply if major features of influence are only used even when a framework or conception is adopted as an underpinning for a research study.

In the context of technology enhanced learning, it is perhaps pertinent to think about distinctions of different forms of underpinning constructs (a term used in this paper to indicate how ideas can be formulated through conceptions

Table 1. Examples of forms of underpinning constructs

Form of underpinning	Description	Examples
Model	holds for a given case or stated population, identifies major features of influence, arising from context-specific research	Technology Acceptance Model (TAM) (Davis, 1989) Diffusion of Innovation (Rogers, 2003) Pathways to Implementing Change (Corbett & Rossman, 1989)
Conceptual framework	tends to be more flexible and descriptive, as it usually identifies factors or criteria that relate to each of the features of influence in a particular field	Technological, Pedagogical and Content knowledge (TPACK) (Mishra & Koehler, 2006) Discovery Learning (Bruner, 1961) Experiential Learning (Kolb, 1984)
Theoretical framework	arises from outcomes beyond a single study, based on one or more theories	Social Creative Constructivism (Passey, Dagienė, Atieno & Baumann, 2019) Human Motivation (Maslow, 1943)
Theory	considers a broader and deeper concern or context, suggesting the detail of what might be more general, beyond one or a number of contexts	Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis & Davis, 2003) Social Constructivism (Vygotsky, 1978) Constructionism (Papert, 1986) Behaviourism (Skinner, 1953)

that may be subjective or believed or even imaged or imaginary) through a number of examples (shown in Table 1). These examples will be illustrated and discussed subsequently, in terms of their context, scope and potential interpretation.

In terms of models, three are offered as examples in Table 1. The origin of these models is quite different, but they all relate to the field of technologies (in the widest sense). The first of these, the Technology Acceptance Model (TAM) of Davis (1989) is a very well-known model, yet it is often incorrectly cited as being a theory. The original TAM was indeed a model, and Davis stated this quite clearly in the title he gave to it. As a model, it provides a structure and a set of features; in this form, using this as an underpinning for a research study is clearly attractive, as it provides clear hooks for both developing research questions and for analysing research evidence. However, it should certainly be recognised that it has limitations if and when it is to be considered for use as a fundamental or strong underpinning to a study, as it has no theoretical credibility as it stands. Diffusion of Innovation (Rogers, 2003) is also often incorrectly cited as a theory – yet Rogers was clear in his original description in calling it a model (or process). It is often used in its model form as a research instrument for conceptu-

alising or analysing stages of diffusion or implementation, without referring to the important text that contextualises and surrounds more descriptive factors that detail the model further. The third model, Pathways to Implementing Change (Corbett & Rossman, 1989) was also described as a model by the authors. But, as in the two preceding examples, the surrounding text that the authors provide offers crucially important factors that offer additional details within its major features. These factors enable this model to be more adequately considered for the purposes of underpinning a study (or elements of it). In all of these three cases, while these models might provide for a complete underpinning to a study, studies that have used these models have tended to apply them to elements of studies, concerned often with the elements of data collection and data analysis.

In terms of conceptual frameworks, three examples are shown in Table 1. The Technological, Pedagogical and Content Knowledge framework (Mishra & Koehler, 2006) is a well-known and well-used framework in technology enhanced learning research. Despite its widespread use, and the fact that the framework is supported by descriptions of the elements of that framework, some researchers have noted that the descriptions are what they describe as being somewhat vague, not allowing easy analysis of their out-

come data. As such, it is found that this framework provides a conceptual base, and it is in this form that researchers have tended to use this for their own studies. The second example, Discovery Learning, described by Bruner (1961) for example, has not been classed as a theory, or as a model. Rather, it is presented as a concept, or a practice that is based upon certain principles. As such, and using those principles, it is possible to use this as a framework, but it is not constituted as a theory. The third example, Experiential Learning, in a paper by Kolb (1984) is described as a model that is then elaborated and proposed as a theory. Certainly, given the level of elaboration, experiential learning is undoubtedly provided as a framework, and is in itself underpinned by a concept of learning. Whilst it could be used as theory, therefore, it is certainly possible to use it as a conceptual framework.

In terms of theoretical frameworks, two examples are offered. The first, Social Creative Constructionism (Passey et al., 2019), is a theoretical framework developed from an analysis of a number of existing theories and frameworks, including Social Constructivism (Vygotsky, 1978) and Constructionism (Papert, 1986). As these two existing theories and frameworks do not accommodate and provide for a contemporary perspective on the development of young people with creative uses of digital technologies, the creation of an integrated theoretical framework through analysis of earlier and more contemporary theories and frameworks sought to address this gap. This example illustrates that underpinnings do not need to be ‘taken off the shelf’, and indeed that underpinnings need to be questioned in terms of their applicability. Rather, underpinnings should be selected carefully or even developed to relate to contexts and circumstances. The second example, Human Motivation, was a theoretical framework that was developed by Maslow (1943), based upon a number of existing theories. This framework is perhaps best recognised through what has been called Maslow’s model of a hierarchy of needs, and this is often the form in which the theoretical framework is used in research studies. The creation and use of this model for underpinning research has been strongly questioned (Bridgman, Cummings, & Ballard, 2019); again, the background theories that led to this framework contextualise it in important ways.

For theories, four examples are listed. The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) was developed through a series of models arising initially from TAM. Following reviews of research using TAM and using subsequent models that were developed, not only did the major features of TAM become expanded, but additional factors and influences were

identified and integrated. With wider application in a range of contexts, this level of applicability was considered strong enough to posit the framework as a theory. TAM started out with a much more focused view from the individual user’s perspective, while UTAUT viewed acceptance and use from a wider range of social and societal influences on the individual. UTAUT, therefore, can provide a wider and more detailed contextual view if used as an underpinning for a research study. The same holds true for the second example, the theory of Social Constructivism (Vygotsky, 1978), in that it was posited on the basis of a wide range of perspectives that had been tested in different contexts over time. This theory considers the role of social influences on learning, as well as the earlier cognitive influences that had been identified, so considers external dimensions on learning in addition to the internal dimensions; as a consequence, the theory is not limited to internal cognitive features alone. Piaget’s (1952) theory of cognitive constructivism, based on a more focused exploration of cognitive features, and taking a more developmental approach to learning, is more limited in terms of its accommodation of social influences (especially when the very limited range of originating participants that led to the findings of the research are considered – in this case, Piaget’s three children and children of some of his colleagues). The third example, the theory of Constructionism (Papert, 1986), was based on Piaget’s theory, but took into account influences of the handling and creating of artefacts by learners. Within a context of digital technologies, this theory, therefore, tends to relate strongly to learning contexts where artefacts are involved, as is the case within contemporary situations of digital technology use. However, as discussed earlier, the forms of digital technology that were used at the time of Papert’s development of the theory were not developed to the same extent in terms of communication uses, or how programming could be used to create the current width of technological outputs by the user. Taking another earlier theory, the fourth example, the theory of Behaviourism (Skinner, 1953), is often now not taken as a serious contender for theoretical underpinning of research studies. Yet, a focal feature of that theory, operant conditioning, undoubtedly arises in contemporary situations – such as the response to stimuli by social media users from received emails or WhatsApp messages, for example.

From the discussion of the different forms of underpinning presented above, one point that emerges is a shift in the parts of the research process that might be supported by models to those that might be supported by theories. Across the four forms of underpinnings, there tends to be an identifiable shift in focus towards elements of the entire research approach and design. This movement concerns the ways that the different forms might be applied to elements

of a research study - from ways that models might support the underpinning of elements such as data collection and analysis, to the ways that theories might support the overall underpinning of approaches and research position or stance taken.

2. Role or roles of underpinning theories or conceptions

The ways that models, frameworks or theories might support a research study (as discussed above), relate to conclusions and discussions that have been drawn from other research literature. For example, Oliver (2002) identified different ways that theories (rather than all conceptual or theoretical underpinnings) can be conceived, and how they might be used in research. When each of these different ways is considered from a critical perspective, they give rise to different questions about implications arising. As an example, for a theory, some implications and questions arising are outlined in Table 2 (using Oliver's four ways to use theory – as a tool, as a principle, for building, and for using – shown in the left-hand column).

Linked to these implications and questions arising, some common myths also need to be considered when choosing and using an underpinning (going beyond considering only a theory) in a study:

- A model, conceptual or theoretical framework or theory is independent of its originating context. Well, this is not true, of course – but if an underpinning is dependent on an originating context, then what are the implications for a study that is being undertaken within another context? To what extent can that underpinning be of value or appropriate or relevant in that new context? For example, Piaget's theory of cognitive constructivism (1952) was based on observation of his children and those of some of his colleagues. Clearly, the theory relates, therefore, to a specific cultural group in a specific temporal, social and societal setting. The application of this theory to other quite different contexts clearly needs to be questioned, rather than unquestionably accepted.
- A theory should not be questioned. Of course, this is certainly not true – and if a theory is to be questioned, then what are the implications for how a study is to be set up? In essence, if to contribute to theory is an outcome of a study, as is often stated for doctoral studies, for example, then how can the theory that underpins the study be framed in such a way as to enable 'new' theory to arise? If the theory that is used only takes those features and factors that are already identified by an existing literature

into account, and this drives the data collection and analysis, then to what extent is it enabling only the same theory to be re-identified, (albeit perhaps in a different context), rather than questioning or adding to it?

Taking further forward the idea of implications arising from the roles that underpinning theory might take, it is possible to consider what the form of contribution of a research study might be in each case. Table 3 begins to explore how role and contribution might be viewed in terms of linkage or relationship.

The questions raised in Table 3 are certainly not meant to be exhaustive. Rather, they should be taken as examples of the forms of questions that can be asked if there are implications that are identified when using a theory in specific contexts or ways. How these questions relate to other forms of underpinnings also need to be considered carefully in any specific research context.

3. Choosing one or more underpinnings for a study

It is perfectly feasible, of course, to select more than one model, framework, concept or theory to underpin a research study. In the context of marketing strategy, Varadarajan (2019) considers reasons and identifies trends in adopting single or multiple-theory approaches in this research field over time, as well as discussing outcomes and implications arising from taking specific approaches. It is certainly possible to take a multi-theory approach even if a study does not seek to develop a new model, framework, concept or theory from a number that exist already. Whilst some researchers come with fairly well-developed ideas of models, frameworks, concepts or theories that align with their own concerns, approaches and position as a researcher, other researchers do not start with this stance, but recognise the possibility and values that different models, frameworks, concepts and theories might bring to their research endeavour. In this latter case, it is more likely that a researcher is concerned with thinking through the study to be undertaken, and identifying methodological stance and approach, and how this might benefit from the use of one or more models, frameworks, concepts and theories. Some researchers might argue that a combination can be conflicting, or would argue for adoption of a single underpinning framework that conceptualises the basis of the study (for example, Passey, 2010) or for a single theory building approach to support wider generalisability (for example, Eisenhardt, 1989). On the other hand, others would argue a different case, that

Table 2. Role or roles a theory can take, and implications arising

Role	Implications
theory as tool	If theory is used as a tool, then it may apply to specific elements of a research study. So, as a tool, does this only create a framework for data collection, data analysis, and subsequent discussions and conclusions?
theory as principle	If theory is used as a principle, then how that principle applies across the elements of the study is an important question. As a principle, does theory as a principle provide a framework that can be used to align with and support approach, design and epistemological and ontological positions?
theory building	If theory is used for building, then this might mean that theory is developed without using or applying an existing theory, or it could mean that underpinning theory is used but is built upon or revised. For building, does this imply that it is possible in a study to adopt a grounded theory approach, or that exploring an additional sample or selection of features and influential factors is fundamentally crucial?
theory using	If theory is for using, then where and how will this use be applied within a research study? For using, does this imply that this provides a basis for comparing or contrasting findings, or critiquing the originating framework?

Table 3. Roles of underpinning theory and relationship to contribution to knowledge

Role	Implications	Contribution
theory as tool	As a tool, does this create a framework for your data collection, data analysis, and subsequent discussions and conclusions?	Does this mean that you are looking for what exists already and for nothing beyond and additional?
theory as principle	As a principle, does this provide a framework that you use for your approach, design and epistemological and ontological positions?	Does this mean that you are limiting the possibilities within a particular epistemological or ontological position, approach or design, so restricting the way that others might use your outcomes?
theory building	For building, does this imply that you will adopt a grounded theory approach, or that your sample or selection is crucial?	Does this mean that you are open to possibilities, but that your use of questions and interpretation of findings will still provide scope for others to question beyond this?
theory using	For using, does this imply that you are comparing or contrasting your findings, or critiquing the originating framework?	Does this mean that you will question, that your main outcomes might not identify new or additional features, but you will offer a different contextual balance?

multi-theory approaches provide for a better sense of situational contexts (for example, Berman, 2013), and establish how more than one form of underpinning would be associated, related and of value. In research, strength of argument often determines possibility in these respects.

For example, can it be argued that both behaviourism and social constructivism could be used as forms of underpinning in a single study? It might at first appear that these two theories are incompatible – that behaviourism is concerned with responses arising from stimuli through operant conditioning, while social constructivism is concerned with the way the learner engages with the external

environment, learning through social interaction. It might be inferred, therefore, that behaviourism is defined as learning that is driven through conditioned response - what has become associated in certain ways with passive learning, or ‘drill and practice’ approaches. For social constructivism, this might be defined in terms of the learner exercising control over learning through engagement and interaction with the environment (what has become associated in other ways with active learning approaches). Ertmer and Newby (1993) provide a useful discussion about the relationship and differences between behaviourism, cognitivism and constructivism. They state that “we have consciously chosen not to advocate one theory over the others, but to stress instead

the usefulness of being well versed in each. This is not to suggest that one should work without a theory” (p.62). From a learner’s perspective, they also quote Drucker’s statement (cited in Snelbecker, 1983, p.203): “These old controversies have been phonies all along. We need the behaviorist’s triad of practice/reinforcement/feedback to enlarge learning and memory. We need purpose, decision, values, understanding—the cognitive categories—lest learning be mere behavioral activities rather than action” (p. 203).

The question that we are left with, then, is perhaps more concerned with why and how we would want to include and integrate more than one form of underpinning. In the case above, social constructivism can be argued as a contextual approach to learning, whilst behaviourism can be argued as a (short- or long-term) response to learning. A note of caution here is to say that considering single or multi-theory approaches should not be confused with taking multi- or mixed-methods approaches. Multi- or mixed-methods approaches are concerned with the gathering and forms of data, and with how questions about reliability and generalisability - or credibility - might be addressed. Multi- or mixed-methods provide evidence to inform research questions, whereas single or multi-theory approaches provide the underpinning and conceptual basis of the study or key elements of it.

4. Overall research design and approach, and relationship of underpinnings

One way to consider the reasons why theoretical or conceptual underpinnings might be used, and the practice of how, is to explore different elements of a study, and how they are related. For this purpose, five elements will be considered: ontological and epistemological position, methodological approach, methodological design, data collection methods, and data analysis methods.

Taking each one of these in turn, initially, ontological and epistemological position are concerned with the stance of the researcher. Ontology has been described as “the study of being” (Crotty, 1998, p.10). This clearly “raises basic questions about the nature of reality and the nature of the human being in the world” (Denzin & Lincoln, 2005, p.183). Ontological position, therefore, can take a view that reality exists independently outside consciousness, or that reality exists only in the interpretation that individual consciousness brings to it. These different positions then tend to lean towards a view of reality that is either objective (a world that can be positively identified) or subjective (a world that is perceived as being different by different individuals).

From a research perspective, it is then a question of how evidence can be gathered to support either one of these positions. Epistemology has, in that context, been described as “a way of understanding and explaining how I know what I know” (Crotty, 1998, p.3). Denzin and Lincoln (2005) explore this further, considering associations between the knower and the knowledge, and they ask a crucial question: “how do I know the world?” (p.183). Epistemology in a research context is concerned with making sense of our world through a methodological approach, where the researcher is aware of their ontological and epistemological position, or they are aware of the possibility to associate with one position or another, according to the nature of the study being undertaken. For any research study, underpinnings clearly need to accommodate the position or stance taken with regard to ontology and epistemology.

Methodological approaches should then be related to ontological and epistemological position. There are different ways in which methodological approaches and philosophical paradigms can be defined and categorised. For example, Kivunja and Kuyini (2017) explore four categories – positivist, interpretivist/constructivist, critical/transformational, and pragmatic. In this paper, three methodological approaches will be explored in the context of relationship to underpinnings, but it should be noted that these are selected as examples, and do not represent the entirety of possibilities within the field. The first of these approaches is post-positivism. Although this paradigm (approach) is often related to an objectivist position, it usually takes a more critical realist perspective, in that identifying an absolute truth is not possible (Letourneau & Allen, 2006). Rather than taking a position that objectivism can lead to truth, post-positivism is concerned with how to research in order to move closer to truth. There is also a recognition here that knowledge can be questioned, and that such critical realist perspectives through objective study can enable a movement towards truth. The second paradigm (approach) considered here is interpretivism. Often related to a more subjectivist position, it is usually recognised that knowledge is highly contextual, in terms of relationship through participants (either individual or groups) to, for example, time, place, culture and external or internal factors. Hence, interpretivism considers the importance of multiple meanings. The meanings of human experiences are a focal concern for researchers taking this approach (Fossey, Harvey, McDermott & Davidson, 2002). The third paradigm (approach) considered here is constructionism. This approach is concerned with the relationship of the interpreter with what is being interpreted (Crotty, 1998). The interpreter, rather than taking an unconnected view, considers the context strongly, in terms of external and internal influences (Charmaz, 2006). The influence

of the context is taken into consideration in this approach, and it is recognised that this can affect interpretation. In this way, knowledge is considered to be a construct rather than providing a truth; knowledge through interpretation is itself a construct rather than something to be identified. The recognition or choice of even these three different paradigms (approaches) can clearly influence the appropriateness of any underpinning conceptual or theoretical framework that might be chosen.

Methodological design is concerned with the structural and overarching scope and practices of a research study. It is not possible in this paper to discuss all methodological designs – that is covered far more effectively in texts dedicated to that arena (for example, Cohen, Manion, & Morrison, 2007; Creswell, 2014). For the purposes of this paper, three examples will be highlighted – case study, phenomenography, and design-based research. In terms of a case study design, as Harrison, Birks, Franklin and Mills (2017) state, case study “has a practical versatility in its agnostic approach... case study research can be orientated from a realist or positivist perspective where the researcher holds the view that there is one single reality, which is independent of the individual and can be apprehended, studied and measured, through to a relativist or interpretivist perspective” (n.p.). Alignment with an epistemological and ontological position or stance, therefore, is more concerned with the strength of argument made to demonstrate that alignment, rather than alignment arising from a simple choice of known appropriateness. Taking a phenomenographic design, the alignment that is possible here is more distinctive. Richardson (1999) posits that phenomenography aligns with “realist” interpretation. Indeed, Marton, a key leader in developing this form of methodological design, stated that the aim of this design is to identify different conceptions of reality (Marton, 1986). If these conceptions are constructed by those using or associated with a phenomenon, then this focus aligns with “constructionism”. By comparison, with a design-based methodological design, the alignment is again not necessarily distinctive. Cross (1999) discussed three concerns with design-based research – design epistemology, design praxeology, and design phenomenology. In terms of design epistemology, Cross referred to “designerly ways of knowing”, which was defined as the ways that designers think about design (Cross, 1999; Cross, 2007). He referred to design praxiology as practices and processes in creating outcomes, while for design phenomenology this was concerned with the connection of a phenomenon created with the users. Whilst it could be possible to argue alignment with a post-positivistic approach, it could also be argued that a constructionist approach could be taken. Here again, the alignment is concerned with form and strength of argument

and discussion, rather than it being determined by a distinct alignment of the methodological design itself.

So far, concerns about choice and application of forms of underpinning that are related to the discussions above tend to focus on theoretical or conceptual underpinnings, through theories or frameworks. However, when data collection methods are considered, whilst underpinnings need to associate with those same background philosophies, there is some scope to look to how other forms of underpinnings might work in addition to those already considered and selected. Taking a case study design as an example, forms of data collection that are suggested by key researchers in this field, such as Yin (2003), Stake (1995) or Merriam (1998), cover multiple forms. These might include interviews, observations, questionnaires, artefacts and relevant background documents. However, interview questions, observation details to be identified, questions in a questionnaire, artefacts to be collected and specific background documents that might be relevant, can be informed by an appropriate underpinning model, framework or conception that aligns with the wider theoretical and philosophical stance of the study. In the case of a study looking at implementation of a digital technology, for example, TAM (Davis, 1989) or UTAUT (Venkatesh et al., 2003) might well provide a model or framework for this purpose. An underpinning construct used to support or inform data collection might also apply to data analysis methods. Taking the example of a case study informed by the UTAUT framework (Venkatesh et al., 2003), it would be just as appropriate to use this framework for data analysis. Indeed, researchers have used such frameworks to undertake both qualitative analyses and quantitative analyses. For example, Abualbasal, Abu-Shanab and Al-Quraan (2016) undertook a quantitative analysis using the UTAUT framework within a case study of use of Microsoft Project by students, while Biljon and Renaud (2008) undertook a qualitative study using the UTAUT framework with a case study exploring applicability to senior mobile telephone users. So, although the same framework was used, it was clear that it was used in a quite different way in each of these studies; the role of the framework was quite different (see Table 3), and this means that the ontological and epistemological position, methodological approach and design could also be quite different.

In a single study, if different models, frameworks or theories are chosen, then they must, of course, align, so that their relationship is understood, and so that they align paradigmatically. An example to illustrate this is shown in Table 4.

The example shown in Table 4 is, on the one hand, com-

plex in terms of the number of underpinning conceptions and theories that are involved, but on the other hand, it indicates the degree of concern that is needed when developing a proposal for a research study that is based through a particular and identified epistemological and ontological position. Alignment of theoretical and conceptual underpinning is important, how it is argued is important, the way it might then contribute to the literature and future research is to some extent determined, but none of this invalidates the possibility of questioning elements of underpinnings that are involved. During and at the end of a study, it is still possible to ask questions about the efficacy of underpinning theories and conceptions, and their relationship to findings at a methodological level.

Table 5 offers some further examples of how studies that have been undertaken over the past few years in the field of

technology enhanced learning (TEL) have been underpinned by models, frameworks or theories.

As can be seen from Table 5, using models, frameworks or theories to underpin research studies neither involves a singular approach, nor is it necessarily a simple choice. In all these cases, the use of models, frameworks and theories has been argued by the authors, and relates to their specific studies and the needs of that research. In the case of Almpanis (2015), for example, it was the argument for epistemological and ontological position that formulated the argument for subsequent uses of underpinning models and frameworks to support the research methods of data collection and analysis. In the case of Topol (2016), it was the argument arising from a concern for understanding the philosophical underpinning that led to subsequent uses of models and frameworks for the research design. By contrast,

Table 4. An example of multiple forms of underpinning constructs for a study

Elements of your research approach and design	Position or stance, and implications	Possible underpinning constructs
Focus or title of the study	An evaluative study exploring the motivational benefits arising from uses of digital technologies	Evaluative frameworks, motivational theories of learning, and models of digital technology practices might all be relevant and possible
Ontological and epistemological position	Ontological position is subjective, concerned with the interpretation that individual consciousness brings; epistemological position is constructivist, concerned with individual constructions of reality	Social constructivism as an overarching theoretical conception is possible
Methodological approach	The methodological approach is interpretivist, related to a subjectivist position, particularly concerned with context in different locations, and considering multiple meanings	Contextual constructivism (Cobern, 1991) as a more related theoretical framework could be chosen
Methodological design	From an interpretivist perspective, a multiple case study design will be taken, in order to consider different contexts, and to gather evidence of a subjective nature to consider how motivational benefits are being evaluated at individual and contextual levels	Multiple case study design with evaluative features focusing on educational technologies (Scanlon, Blake, Issroff & Lewin, 2006) could be selected
Data collection methods	Data will be gathered in six different institutional settings, where the same digital technologies are being used, where mixed methods gather evidence about uses - from documentary evidence, observed by the researcher, described by the teacher, and motivation from uses can be evaluated by learners	Evaluation of motivational outcomes are framed through the self-determination theory of Deci and Ryan (2002) and self-theories of Dweck (1999); data gathering instruments are created using these underpinning frames
Data analysis methods	Data are analysed both qualitatively and quantitatively, from interpretivist and subjectivist perspectives	Motivational frames are used as ways to identify forms of motivation, while data are analysed in and across cases

Table 5. Examples of studies in TEL that have used a range of underpinning constructs

Study title	Methodological approach	Underpinning constructs
A teacher perspective of ICT integration in Saudi Arabia secondary schools as a possible alternative to western ICT integration (Alenezi, 2013)	Strategic evaluative case study approach	Adoption model (Alwani & Soomro, 2010) Diffusion of innovations theory (Rogers, 2003) Concerns-based adoption model (Hargreaves, Lieberman, Fullan, & Hopkins, 2010) Signature pedagogies concept (Shulman, 2005a)
The Integration of ICT within Teaching and Learning Environments in Education Faculties in Saudi Universities: Challenges and Potential for Change (Alenezi, 2014)	Mixed methods approach	Constructivism (Bruner, 1990) Technology acceptance model (Davis, 1989) Adoption theory of ICT (Kwon & Zmud, 1987) Dialectic and dialogic approaches to learning (Ravenscroft et al., 2007) E-learning theory (Haythornthwaite & Andrews, 2011)
An empirical investigation into factors influencing the adoption, diffusion and use of web-based learning technologies: a single case study in higher education (Tam, 2014)	Empirical case study	Technology acceptance model (Davis, 1989) Diffusion of innovations theory (Rogers, 2003)
Study and Evaluation of Active and Multimodal Practical Learning in a Novel Technology-Enhanced Anatomy Learning Laboratory (Sen, 2016)	Mixed methods approach case study	Situated cognition (Lave & Wenger, 1991) Social constructivism (Vygotsky, 1978) Evaluation framework (Kirkpatrick & Kirkpatrick, 2007)
Tackling low learning outcomes in South Africa: The contribution from informal mobile learning (Lambrecht, 2015)	Case study design	Phenomenography (Marton & Booth, 1997) Activity theory (Engeström, 2001; Engeström & Sannino, 2010)
Staff development needs of academic staff involved in blended and online course delivery in higher education institutions in the United Kingdom (Almpanis, 2015)	Mixed methods approach	Dimensions of e-learning (Aimard, 2011) Model of educational interactions on the semantic web (Anderson, 2004) Five-stage e-tivities model (Salmon, 2003) Laurillard's conversational framework for instruction (Saint Mary's University of Minnesota, 2013)
Manipulating affordances in practice: A hermeneutic phenomenological study of mobility impairment and uses of digital technologies in work (Topol, 2016)	Hermeneutic phenomenological study	Affordance theory (Gibson, 1986) Hermeneutic phenomenology (Heidegger, 1962) Social barriers model of disability (Roulstone, 1998)
Assessing the uses and impacts of Facebook for teaching and learning in classroom education contexts in Malaysian universities (Lee, 2018)	Multiple-methodology approach	Uses and gratifications theory (Katz, Blumler, & Gurevitch, 1974) Social constructivist theory (Vygotsky, 1978) Technology acceptance model (Davis, 1989) Conversational framework (Laurillard, 1999)

Table 5. (cont.) Examples of studies in TEL that have used a range of underpinning constructs

Study title	Methodological approach	Underpinning constructs
The Whole World In Their Hands: An investigation of the influence of mobile technologies on learner engagement of primary school children in outdoor settings (McDowell, 2018)	Design-based methodological approach	Place-based learning (Zimmerman & Land, 2014) Contextualised learning (Rikala & Kankaanranta, 2014) Kinaesthetic learning (Pruet et al., 2016) Constructionist learning (Papert, 1986) Experiential learning (Lai, Yang, Chen, Ho, & Chan, 2007) Child-centred learning (Dewey, 1938)
Designing curricula to develop digitally capable professionals in engineering and management - the case in two UK universities (Varga-Atkins, 2019)	Multiple-case study methodology	Signature pedagogies concept (Shulman, 2005a, 2005b) Digital capability framework (JISC, 2017)
A professional development programme for supporting teachers in the design, development, and implementation of Technology Enhanced Learning activities for teaching Arabic as a foreign language (Essam, 2019)	Design-based research	Conversational framework (Laurillard, 2002) Learning elements framework (Passey, 2014)
Innovative online computer supported collaborative assessment: the influence of learning approach and intensity of use on outcomes for healthcare undergraduates in a single university setting (MacDonald, 2019)	Action research methodology	Grounded theory (Glaser & Strauss, 1967) Computer supported collaborative learning (Dillenbourg, 1999)
Moving Towards Flexible Ubiquitous Agnostic Design (FUAD) Framework from an Informed View of Lecturers' Practices (AlOkailly, 2019)	Theory-driven evaluation approach	Flexible pedagogy (Ryan & Tilbury, 2013) Ubiquitous learning (Cope & Kalantzis, 2010) Device neutral assignments (Campo, 2013)
Exploring student perceptions about the use of visual programming environments, their relation to student learning styles and their impact on student motivation in undergraduate introductory programming modules (Kotsovoulou, 2020)	Evaluative case study approach	Technology acceptance model (Davis, 1989) Motivated strategies for learning (Pintrich & de Groot, 1990b) Science motivation (Glynn, Taasoobshirazi, & Brickman, 2009) Index of learning styles (Felder & Soloman, 1993)

Essam (2019) and Kotsovoulou (2020) focused the majority of their argument on the underpinnings of their research design and methods.

Reading the range of research studies that are listed in Table 5, it is clear that at doctoral level, and for theses, a great deal of detail and associated word count is devoted to the description and argument associated with enabling the reader to understand their choices and uses of model,

framework, conceptual or theoretical underpinnings. Journal articles, whilst commonly considered to be a main source of research background, do not usually provide for this same level of detail and allow for a word count that can be devoted to this element or level of description. It could be argued that this might be a reason why so many journal articles do not give so much attention to the detailed discussion and description of this element, and, consequently, appear to be devoid of conceptual or theoretical underpinnings. Some

journals do specifically aim their paper selection and focus on conceptual and theory development, and on theoretical concerns, such as *Theory and Research in Education* (Sage Journals, n.d.), or *Educational Theory* (Wiley, 2020). In the field of technology enhanced learning, there are authors who focus strongly on theoretical concerns, and draw attention to the importance of developing scholarship more fundamentally in this direction (for example, Oliver, 2002; Bennett & Oliver, 2011).

5. How a study might contribute to knowledge or theory

Going back to the original discussion about contributions to research, policy and practice, the question remains as to what contribution a study can make when it is based on theoretical and conceptual underpinnings. A part of this contribution must, of course, come from addressing a gap in the literature – but to what extent that gap is related to or reliant on theoretical or conceptual underpinnings is an important question to ask. Certainly, Bennett and Oliver (2011) argue that contribution can come from more focused studies that explore the very nature of underpinning theoretical conceptions of technology enhanced learning. Whilst it is possible to see how contributions could arise, it is also important to consider how the use of underpinnings might lead to limitations. Passey (2019), for example, argues that the concept of technology enhanced learning itself has not been developed in contemporary contexts and that this in itself is a potential limitation to understanding how underpinnings can be appropriately considered and selected. One way to consider these concerns (although it should be recognised that this is not the only way that this could be done), is as follows.

For a model, contributions to research knowledge might be either understanding how the model might apply to other contexts (as in Tam, 2014, for example), or understanding whether the elements in the model apply, the extent to which they apply, or whether some should be added or amended. Contributions to policy or practice knowledge might be understanding how the model applies to a specific policy or practice area not previously researched, or understanding how the model supports specific actors involved in policy or practitioner actions and decisions. In some circumstances, a model might not be found to be highly applicable, and whilst this can in itself be a contribution rather than a limitation, a study might provide evidence that the model is more contextual than had been initially considered. Alternatively, in some cases, the model might limit the factors that are considered, so that others that

are pertinent are not recognised – so, data collection and analysis methods need to accommodate for the possibility of drawing out additional factors that go beyond those in the initial model or framework. In the field of research in technology enhanced learning, contributions that can arise from and limitations that apply to the use of underpinning models is of particular importance. As technologies continue to be developed, their functionality shifts over time, their uses shift over time, and the ways they are integrated into social practices shift over time. This means that models arising from research in one technological and temporal context need to be regularly checked for applicability to other contexts. The way in which the TAM (Davis, 1989) was checked and developed into the UTAUT (Venkatesh et al., 2003) shows how an initial concern with identifying user acceptance (of temporal importance in the 1980s) was shifted to a later concern on identifying use within social practices (of greater concern in the 2000s). In this regard, if research studies that are undertaken continue to focus on challenges that are linked to temporality and focus on matters of technological development and their outcomes rather than on longer-term patterns of development that apply to social and societal concerns, then applicability is likely to be focused much more on a ‘new’ technology than it would be on the movement to a contemporary social practice.

For a conceptual framework, the same contributions as those in the point above could apply. For contributions to policy or practice knowledge, giving recommendations to those in policy or practice, based on the findings of the research using the conceptual framework might also apply (as was the case in McDowell, 2018, for example). Not in this case, but it is always worth noting that a chosen framework might similarly limit the factors that are considered, so that others that are pertinent are not recognised. Again, data collection and analysis methods need to accommodate for the possibility of drawing out additional factors that go beyond those in the initial framework (as in Alenezi, 2014, for example). In the field of research in technology enhanced learning, contributions that can arise from the use of underpinning conceptual frameworks may address some of the limitations of using models for underpinning purposes. A conceptual framework can be used in a time-bounded way, but it can be used in ways that also consider shifts and developments over time. It might be argued that understanding a shift over time might offer a more predictive possibility in terms of outcomes. For technology enhanced learning, therefore, this could mean that whilst a model might offer ideas for implementation into practice over a short time period (if it is contextually bounded), a conceptual framework might offer a wider policy and practice perspective that would enable predictions applying to implementation

and uses over longer projected periods of time. An example of this form of predictive potential would be the case of networked learning. Findley (1988) developed initial concepts of Collaborative Networked Learning in a seminal research project. The term and concept have endured, nevertheless, over time and context. Nearly 20 years later, Goodyear, Banks, Hodgson and McConnell (2004) clarified and defined the concept in terms of educational practices. Nearly 20 years after that, the concept is still pertinent, and applicability in contemporary contexts is regularly researched, revisited and applied - for example, in the practices used to support doctoral student engagement on programmes at Lancaster University in the Department of Educational Research (2020).

For a theoretical framework, the same contributions as those in the point above could apply. For contributions to research knowledge, understanding how the different theories that provide the basis for the theoretical framework work together, or offering a potentially different methodological approach that uses the theoretical framework, might also apply (as in Topol, 2016, for example). The framework might again limit the factors that are considered, so that others that are pertinent are not recognised, implying that data collection and analysis methods should accommodate for the possibility of drawing out additional factors that go beyond those in the initial framework. The ways that the different theoretical elements relate should undoubtedly be questioned as a part of the study, and one way to address this would be through the research questions, which might include one that explores the relationship of the different theoretical elements within the study approach taken. In the field of research in technology enhanced learning, contributions that can arise from the use of underpinning theoretical frameworks may similarly potentially address some of the limitations of using conceptual frameworks for underpinning purposes. While conceptual frameworks offer longer-term perspectives compared to models, they can also be limited in terms of wider social context. Networked learning, for example, is aligned to the context of learning and education. A theoretical framework can go beyond a single context, and cover wider social practices. Ngai, Tao and Moon (2015), for example, explored how previous research into social media and its applications had been underpinned by theory. Contextually, their review and findings went beyond a single subject context, but their conclusions nevertheless highlighted important areas for further research. The authors stated that “important areas, such as organization orientation, social power, cultural differences, and impacts of social media, have not received sufficient research attention” (p.42). In terms of the focus of their contribution, this was clearly focused as a research contribution. If they had been seeking

a practice or policy contribution, their research questions, selection of literature, and specificity of context would have been quite different, and this might well have led them to take a focus underpinned more at a model or conceptual level (see Kotsovoulou, 2020, for example).

For a theory, the same contributions as those in the point above that relate to a conceptual framework could similarly apply. Additionally, for contributions to research knowledge, understanding whether the features in the theory apply, or whether some features should be added or amended could also apply. If the theory is not questioned as a part of the study, its applicability to that context will not be questioned. To address this limitation, research questions should include one that explores the validity of the theory within the study context. In the field of research in technology enhanced learning, contributions that can arise from the use of theories may similarly address some of the limitations of using theoretical frameworks for underpinning purposes. Bower (2019), for example, develops and argues the case for adopting technology-mediated learning theory, basing this contemporary theory on a wide variety of background frameworks and prior theories. Theories of this form provide the widest forms of contextual underpinnings, but at the same time, those theories can still be based on limited geographic and cultural contexts (see Lee, 2018, for example).

Forms of contribution from research clearly relate to the ways that models, frameworks or theories are applied within the overall research study and design. In the example in Table 4, social constructivism as an ontological and epistemological position might be considered at the end of the study in terms of how far or at what levels it is matched or applied, whereas contextual constructivism could perhaps be more questioned as to its validity within the study, and whether there were strengths or weaknesses related to its use. In the same example, regarding the use of self-determination theory and self-theories of motivation, the ways that these are linked, the appropriateness of their use, and whether any features or factors emerged that would be particularly highlighted, added or redundant, could certainly add to a theoretical contribution, related to the context of the study.

When considering contribution, limitations should be considered in terms of the ways that theory and other underpinnings are used. Going back to the categorisation of uses of theory by Oliver (2012), limitations vary according to intended use, whether it is intended that theory be used as a tool, a principle, whether it is intended for theory building, or for theory using. From this categorisation, using theory for theory building is clearly the most likely to avoid

limitations of theoretical contribution (see Bower, 2019, for example).

6. Conclusions

The key conclusion that arises from the discussion and argument presented in this paper is that choice of underpinning and choice of role that models, frameworks or theories play can both provide for and potentially limit the opportunity for a study to question and, therefore, to develop theory as a contribution arising from that study. The role of questioning and argument (criticality) is paramount in addressing these concerns.

When considering using models, conceptual and theoretical frameworks, and theories to underpin a research study, to avoid limitations when considering appropriate underpinnings, the analysis from this paper highlights and recommends:

- For any underpinning considered, its status from the originating research should be identified and recognised. From this understanding, an appropriate focus through research questions, design and methods can draw out particular areas of contribution, which can be different in each of the cases for a model, framework or theory. This is particularly important for research in technology enhanced learning as the field is relatively new, so many models, frameworks or theories are often taken from different contexts. For example, Kim and Hannafin (2011) explored the appropriateness of the basis of constructs of problem-solving and scaffolding (both developed outside the technology enhanced learning field) when they studied the scaffolding of problem-solving in technology enhanced learning environments.
- Similarly, the context from which any underpinning is generated should be identified and recognised. Questions about applicability within other contexts, and in the context of a specific study, should be raised. For example, Lytras, Sarirete and Damiani (2020) explored technology-enhanced learning from a transformative perspective, but as this was in the context of higher education, how far their model would apply to training, compulsory or vocational education sectors is not clear.
- Criticality is a key concept that should be applied as much to models, frameworks and theories as it is to the focal concern or the problem of the study to be investigated itself. This criticality should apply through a study's research questions and methods as much as through any review of literature or previous research. For example, how far does Laurillard's conversational framework (2002) enable the practice of teacher professional development in creating e-books for reluctant readers to be assessed as effective by an observer?
- Epistemological and ontological stance within a study may shape the choice and role(s) of models, frameworks and theories. This does not eliminate a concern to question how those with other epistemological and ontological stances might still gain in terms of contribution arising from a study that is based on a specific stance and appropriate underpinnings. For example, how far do the findings of a study about uses of social media to support peer learning through an interpretivist approach enable recommendations to be viewed as feasible by policy makers with positivist stances?
- Methodological design that is underpinned by appropriate models, frameworks or theories does not mean that the design itself cannot be questioned. Critical questioning of methodological design (underpinned by appropriate models, frameworks or theories) can lead to developments that contribute to research in major ways. For example, Collins, Joseph and Bielaczyc (2004) questioned whether a methodological approach using design research, underpinned by pragmatism, was appropriate and could be developed for analysing evaluative needs to support developments such as communities of learners. Similarly, Wang and Collins (2005) questioned appropriateness and future challenges in using a design-based research approach in developing technology-enhanced learning environments.
- Research questions should be framed in ways that allow alternative ways to view factors and features relating to underpinning models, frameworks or theories. Finding contextual matches, shifts, amendments or additions can all offer important contributions to the field. For example, Varga-Atkins (2019) used research questions that allowed her study to identify an additional element to Shulman's underpinning concept of signature pedagogies (2005a), in the form of signature assessments.
- Contributions to policy and practice should be considered in the context of underpinning models, frameworks or theories. The generation of recommendations to policy and practice can be important contributions in themselves, which can evolve from research findings that have been underpinned by previous policy or practice. For example, Alenezi (2013), by reviewing underpinning concepts in a Saudi context, was able to offer recommendations for policy that aligned specifically with that context.

Concerns for underpinning of our studies through an appropriate conceptual and theoretical base can present a challenge for us as researchers. It is clear that our research knowledge in the areas of epistemological and ontological positions, methodological approaches and design, research data collection and analysis methods, have all relied upon critical perspectives by previous researchers through their published works. Taking models, frameworks and theories for granted will only limit our ultimate knowledge; we must be prepared to question these from the inside (when and during use) as well as from the outside (before we use them).

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