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EXPLORING THE PROBLEM OF ESTABLISHING HORIZON EMERGENT TECHNOLOGIES WITHIN A HIGHER EDUCATION INSTITUTION'S OPERATIONAL FRAMEWORK

Paula Shaw [p.shaw@derby.ac.uk], Sarah Rawlinson [S.Rawlinson@derby.ac.uk], David Sheffield [D.Sheffield@derby.ac.uk], University of Derby, Kedleston Rd, Derby DE22 1GB, United Kingdom

Abstract

Since the early 2000s, a plethora of web-based learning technologies has been developed, each proposing to improve the student experience. Yet, a study conducted by Martin et al. (2018) demonstrate sporadic new technology adoption in Higher Education (HE), despite wide-scale social interest and a wealth of academic publications. This paper aims to provide a framework to explore this problem from an institutional perspective, involving both educational planners and pedagogues. This framework, the Pedagogic Realignment with Organisational Priorities and Horizon Emergent Technologies Framework or PROPHET Framework, is a new three phase framework that combines two distinct research methodologies used by policy makers and pedagogues with a new dynamic multi-level diffusion of innovation (DMDI) model specifically designed to support dialogue between these stakeholders. Application of the PROPHET Framework will enable stakeholders to arrive at a common understanding about the efficacy of such new technologies and collaborative exploration of technology through these different lenses will lead to increased confidence in its value and relevance. It is hypothesised that undertaking this process will increase the adoption rate of Horizon Emergent Technologies, resulting in operational policy amendments and evidence of impact in the learning environment.

Abstract in Italian

Dall'inizio degli anni 2000 sono state sviluppate numerose tecnologie di apprendimento basate sul web, ognuna delle quali propone di migliorare l'esperienza formativa degli studenti. Nonstante l'ampio interesse sociale e l' alto numero di pubblicazioni accademiche, lo studio condotto da Martin et al. (2018) dimostra come l'adozione di queste nuove technologie nel contesto dell'istruzione superiore (HE) rimane tuttora sporadica.

Questo articolo propone un quadro di ricerca mirato ad esplorare questo problema da una prospettiva istituzionale, coinvolgendo sia pianificatori educativi che pedagogisti.

Il modello "Pedagogic Realignment with Organisational Priorities and Horizon Emergent Technologies Framework or PROPHET Framework", e' un nuovo modello di ricerca trifase che combina due distinte metodologie di ricerca utilizzate da responsabili politici e pedagoghi con un nuovo dinamico modello di diffusione dell' innovazione a multilivello (DMDI) specificamente disegnato per facilitare il dialogo tra le parti interessate.

L'applicazione del modello di ricerca PROPHET consentirà alle parti interessate di giungere a una comprensione comune dell'efficacia di tali nuove tecnologie cosi come l' esplorazione collaborativa del tecnologia attraverso queste diverse ottiche porterà ad una maggiore fiducia nel suo valore e rilevanza. Si ipotizza che l'intraprendimento di questo processo aumenterà il tasso di adozione di Horizon Emergent Technologies, determinando modifiche delle politiche operative e evidenziando impatti nell'ambiente di apprendimento.

Keywords: Horizon Scanning, ITC, Policy, Design, Implementation, Impact on learning

Introduction

Since the early 2000s, the development of Higher Education has been inextricably linked with Horizon Emerging Technologies (HET). Educational experts in the UK, Europe and the USA predict the adoption rate of these technologies in the form of horizon reports.

Firstly, horizon reports suggest that adoption of certain educational technologies is imminent. In reality, without impactful evidence of efficiency and improvements on the existing tools already in circulation, institutional confidence in their value is low (Kirkup & Kirkwood, 2005).

Secondly, confidence in some technologies is raised by societal adoption, for example, social media. There is evidence to suggest (Martin et al., 2018) that technologies with low societal value but potentially high educational value are rejected because they are not easily understood.

Thirdly, institutional decision making rarely includes a cross section of stakeholders debating collectively, the proposed technology's impact. By stakeholders we envisage two groups (a) educational planners which include senior leaders, quality assurance practitioners and IT implementers and (b) pedagogues which include educational practitioners, researchers and where possible students. People spend significant portions of time alone imagining and testing new technologies. This leads to multiple interpretations of its use and value and results in partial, ineffective implementation (Leonardi, 2009; Martin, 2018).

This paper proposes solutions to these three problems. The aim is to increase shared confidence in a range of technologies between a cross section of stakeholders by strengthening the debate, resulting in a clearer sense of educational value, institutional alignment, implementation and pedagogic impact when introducing technologies.

This paper goes on to establish a three phase conceptual framework that brings together pedagogic realignment (PR) with organisational priorities (OP) and horizon emergent technologies (HET). These three concepts are combined to form the acronym "PROPHET".

The first phase of the PROPHET Framework collates what is known about HET, educational policies, research and practices to establish the conceptual background. The second phase schedules stakeholder discussions, whether these are focus groups, workshops or similar, to develop a shared understanding of HET in their educational context. This phase is of critical importance and should not be overlooked. The third phase initiates policy adjustment and design principles to enable the stakeholders to move forward with shared effective implementation.

Background

The three problems identified by higher education institutions, namely horizon reports, adoption of technologies and inclusive decision making, are discussed in more detail this section. This is followed by the design of the PROPHET Framework as a solution to these problems.

Horizon reports

There are many horizon reports in circulation, however we chose to focus on four that are most frequently mentioned in higher education circles. The first is the New Media Consortium (NMC) now EDUCAUSE Higher Education Horizon Report; this is perhaps the most well-publicised and long-running annual report with a readership of several million across the globe since 2004

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(Johnson et al., 2015) Now in its fifteenth year, this report constructed through a Delphi method, draws on the predictions of a global network of higher education experts.

The second report provides a European context. The Horizon 2020 (H2020) European Union Research and Innovation programme reports on more than the educational technology. Through research and innovation, it aims to increase the adoption rate of Future and Emerging Technologies (FET); those with a transformative, high potential impact on our economy and society (European Commission, 2019), and its target is non-scientific audiences, peers, business partners and policy makers.

The third and fourth reports are produced in the UK. The Open University's Innovating Pedagogies report serves a similar function to the NMC Horizon Report, and reports on novel or changing pedagogic theories and practices for the technology-enabled world, over a ten-year period (Ferguson et al., 2019). Its target audience is academic practitioners and policy makers. The newly launched Advance HE On the Horizon report (2019) demonstrates the sector's continuing interest in such reports. It focuses on sector changes within the next five to ten year by gathering the perspectives of senior leaders (Martin, 2018).

These reports together provide a measure of the emerging educational technology landscape in higher education across the globe. Certain technologies are reported as ready for adoption (within one to five years) and others are suggested to have a longer adoption period (five to ten years). All of them target policymakers but only the Innovating Pedagogies report openly writes for pedagogues, suggesting that collectively their aim is to inform individual with the greatest implementation powers. They are not completely hypothetical however, as they showcase pockets of successful implementation through case studies. Yet they fall short of evaluating adoption rates across the sector.

Adoption of technologies

Martin et al. (2018) hypothesised that quantifying social interest in new educational technologies and correlating this with the amount of published pedagogic research, would determine the impact of these technologies in an educational setting. Martin (ibid, 2018) concluded that the NMC Horizon Report was successful in predicting 50% of HET uptake which counters the claim that all these HET were ready for "imminent" adoption. Unsurprisingly, the most successful educational technologies were those attracting high social interest.

Social technology interest forms at the macro level (sector) and has the potential to affect nested level of culture within a social system such as a HEI. In a multi-level dynamic model of culture both top down (macro to micro) and bottom up (Micro to macro) processes occur at the same time, influencing change across and between levels (Erez & Gati, 2004). However, the extent of HEI meso level adoption will depend on the level of homogeneity of members' perceptions and beliefs (Schneider, Salvaggio, & Subirats, 2002). This process of adoption is further explained by Rogers' (1995) Diffusion of Innovation (DoI) theory, in which innovation is communicated by change agents amongst members of the HEI. The purpose of these communications is to reduce uncertainty about the innovation and alter the HEI's structure and function. Different rates of adoption across the HEI are explained by individual's uncertainty about the innovation; the relative advantages, compatibility, complexity and the opportunities to test and observe the innovation within their practice.

HEIs operate a centralised diffusion system in which a small number of educational planners act as change agents. These officials, to a greater degree, are part of the same homophilous group; sharing the same beliefs and educational goals. This top down approach becomes fragmented when

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diverse (hetrophilous) groups at the micro level do not perceive the innovation's value; put simply, the two levels do not always speak the same language. The result, Martin (2018) argues, is that today's teaching habits are unchanged and the use of new technologies are largely supplementary. Moreover, defining exactly what has changed relies on clear nomenclature, which does not appear to exist with educational technologies. For example, the 2005 NMC Horizon Report uses the term "Extended Learning" to define a learning situation we are familiar with "where classroom instruction is supplemented by an interactive component facilitated by technology tools" (NMC and NMII, 2005; p.6). This concept appeared again in 2014 and 2015 as Flipped Classroom (Johnson et al., 2014; 2015) and in 2019 as Blended Learning (Alexander et al., 2019). Likewise, early publications speak about Learning Technologists whereas the 2019 report changes the language to Learning Designers (Ibid, 2019). Such shifts in vocabulary and lack of common language make it difficult for stakeholders to estimate the value of HET. Clarity would normally be derived from the diffusion of HEI information and data which is interpreted dynamically between and across multiple levels. Therefore, dynamic multi-level interpretation and diffusion of innovation are an important first step in this adoption process, to ensure that the two levels (meso and micro) speak the same language.

Inclusive decision making

According to Morley (2012) in order to understand this changing landscape, new conceptual vocabularies are needed; clear definitions lead to understanding and fruitful discussion. It appears therefore that consistent terminology has a great deal to do with educational technology adoption and its perceived success in higher education. Lipton (2005) questioned what could be done to explain the breadth and depth of educational technology in a concise way rather than wasting time on justifying its existence. Rogers (1995) suggests that for adoption to succeed, interpersonal diffusion needs to expand the degree of homophily; learning lessons from peers to reduce uncertainty about the advantages and disadvantages of the innovation. Over time, a critical mass of adopters is achieved and a "tipping point" ensues. In order to conceptualise educational technology, stakeholders may simply draw parallels with innovative use of technology in society but as indicated above, this does not mean that the innovation would naturally translate well into a learning environment.

The following section explores a conceptual framework for use within HEIs, to support stakeholders when evaluating HET for adoption and subsequently exploring its impact on student learning. As Roger's Diffusion of innovation theory and Erez and Gati multi-level dynamic model of culture suggests, the two groups of stakeholders will approach the problem from different points of view. Educational planners will be cognisant of external policy, legislation and operational strategy, whereas the researchers, practitioners and students will be concerned with its application and impact in the learning environment. To achieve a successful outcome, all the stakeholders will need to feel that they have been able to contribute to a shared goal.

Methodology

Designing a framework to support discourse must tie together three phases of enquiry; conceptual background, conceptual analysis and acculturation. We investigated a range of methodologies to determine which would satisfy the needs of educational planners whilst concurrently satisfying the practical needs of pedagogues. Two methodologies were combined; Institutional Analysis and Development (IAD) in HE structural reform and Design-Based Research. Each of these are explored next.

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Institutional analysis and development (IAD) in HE structural reform

In order to satisfy the educational planners, the process requires action framed by the macro context and the existing operational framework. Ostrom (2005) refers to the participants in this process as actors, who are the "decision-making entities assigned to a position and capable of selecting actions from a set of alternatives" (2005; p.38). Actors can represent themselves or a department within the organisation. Actors from different internal communities come together in "Action Arenas". To achieve IAD in HE structural reform a desk study is recommended in phase one, followed by workshops or focus groups in phase two and testing in live environments during phase 3. Figure 1 shows an adaptation of de Boer et al. (2016) model. In this model, adaptations to policies are likely to emerge during consultations with actors. Ostrom (2005) cautions actors against directly transferring policies from one context to another, as they may have a different impact due to unknown national and local contexts. This may hint at starting again with a policy, a more pragmatic suggestion is to identify the problem at a specific level and learn the language to understand it, at least one level above and below the problem.

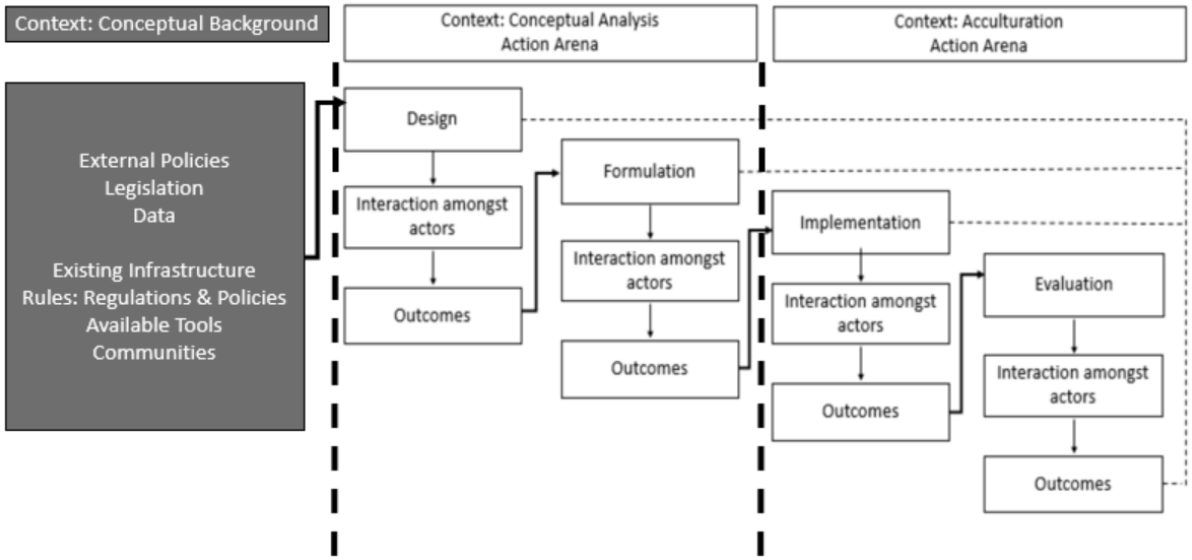

Figure 1. Institutional Analysis and Development Framework for HE Structural Reforms (Adapted from de Boer et al, 2016)

Combining IAD with a second more practical method, Design-Based Research, provides an opportunity for pedagogues to think about planning restrictions whilst still in the analytical phase. Rather than viewing educational planners as obstructive to the process, they come to understand the limitations of the sector and the institution. Equally, instead of viewing pedagogues as idealists, educational planners will engage with language to understand HET in context and its purpose in improving student-learning experiences.

Design-based research

Design-based research satisfies the needs of pedagogues, drawing on a variety of traditional methods to achieve its goal. At its centre, design-based research aims to build a strong connection between stakeholders and real-world problems. During the last decade, it received attention as an emerging framework that cohesively brings together innovation, technology and education (Van den Akker, Gravemeijer, McKenney, & Nieveen, 2006; Brown, 1992; Design-Based Research Collective, 2003). Recognising that innovation is iterative, design-based research does not set out to evaluate a single product or artefact; instead, it focuses on the process of producing design

principles that are replicable. However, it must be recognised that the complexity of design-based research is significantly increased in educational settings. Rather than studying whether the technology merely works or not, stakeholders must establish the technology's potential to aid learning. For example, a focus on students, their interaction with the technology and a positive learning experience will require observation of social shifts between one student and another, between students and their tutor and between learning communities and resources. Undertaking such studies requires stakeholders to be aware of the plethora of variables it creates, as Amiel and Reeves (2008; p.35) contend "the sheer number of variables is indeed so many that one-shot studies of impact would lead to very limited insight". Stakeholders must be committed to intervening and remodelling policy in line with organisational priorities (OP), and applying pedagogic realignment (PR) where it has proven not to work.

Reeves (2006) Design-Based Research model is relatively simple, as illustrated in Figure 2 below.

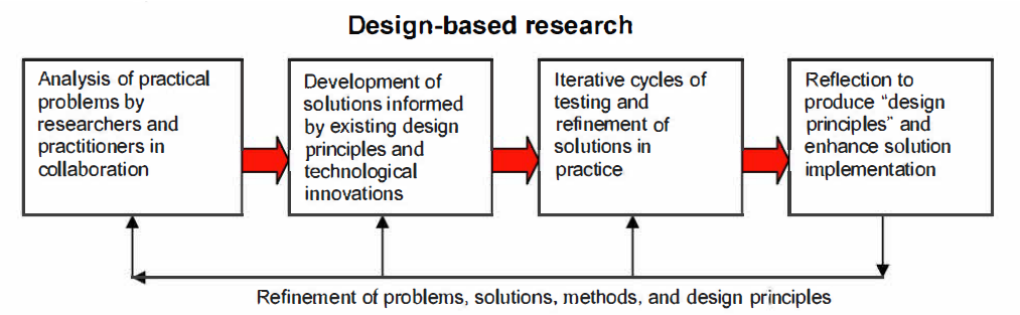

Figure 2. Reeves (2006) Design-Based Research Model

Neither the IAD model nor design-based research model satisfied both the needs of educational planners and pedagogues in the end-to-end process we required for the three phases of our enquiry. This is because the IAD model focuses on policy whereas the design-based research model focuses on practice. We took the decision to combine the two models to create one framework to meet our needs.

The new framework

Phase 1: Conceptual Background

In the conceptual background phase of the new framework, stakeholders develop their understanding of HET, governmental policies and practical impacts at a macro level. This phase, will scrutinise a proposed educational technology or a combination of technologies to achieve a significant shift in practice. The Horizon Reports are able to provide this first glimpse of the future, highlighting the potential contenders for investigation. However, this information alone does not provide a robust foundation for decision-making. Salmon and Asgari (2019) encourage disruption of the status quo; embracing the challenge of creating a 360-degree view of emerging learning futures. Correlating horizon reports with legislation, policies, sector data, evidence-based research, and societal trends (particularly where scientific and pedagogic research is negligible), identifies those technologies with a potential for further investigation.

Phase 2: Conceptual Analysis

In the conceptual analysis phase, stakeholders grapple with problems, establish a common language and understand the use of HET within their own educational setting. During this phase, stakeholders aim to solve a problem when there is a lack of clarity, adding new terms and enriching the conceptual background without changing its initial meaning. By uncovering fine-grained differences in meaning, stakeholders are able to articulate these differences in context (Jackson,

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2013). However, in practice, this oversimplification denigrates the time and processing it takes to arrive at a common understanding. This type of dialogue is not easy, especially in situations where there is an uneven power balance amongst stakeholders; those in a senior position or authority and those that are the users of technology at the forefront of teaching. For some stakeholders, letting go of previously held assertions and agreeing on a set of common themes may require crossing of a conceptual threshold, a "Leap of Faith". Meyer and Land (2005) first introduced the idea of the "Conceptual Threshold", this being a gateway that leads the inquirer away from the previous misconceptions and "troublesome" ways of thinking about things to a new way of understanding and interpreting concepts.

In our new framework, it is necessary to understand that the conceptual threshold is the bridge to implementation. It is suggested that this gateway is "transformative" leading to a perceptual shift, "irreversible" and unlikely to be forgotten, and "integrative", exposing previously hidden relationships. Stakeholders need to cross the conceptual threshold and consolidate their thinking before starting the process of designing principles for adoption. Reaching a common accord, paves the way for the third phase where HET is tested in live environments. However, if the vision, strategy, financing and opportunity for implementation do not support the innovation for adoption it would be unwise to proceed to the third phase.

Phase 3: Acculturation

Should the principles for adoption successfully pass a shared consensus of value, the third phase of test and refinement in live environments is required, concurrently capturing evidence-based outcomes and adapting institutional policies. Completing the three phase cycle will bring stakeholders closer to understanding the HET's true potential, with appropriate policies and design principles in place. Furthermore, the process of implementation can be measured in timeframes, testing and impact.

With the three phases explained, it is our view that the second phase discussion is often overlooked because it is difficult to engage pedagogues and educational planners in conversations together around abstract themes. Furthermore, in bringing the two models together we identified a significant gap that could jeopardise the adoption of new technologies in HEIs, by jumping from the conceptual background straight to implementation.

In order to ensure that this second phase is not overlooked we introduced a new visual model. This visual model supports dynamic multi-levels of diffusion of innovation, policy and practice. By introducing the new visual model and bringing together the IAD model and the Design-Based Research model we were then able to satisfy the end-to-end process we required. Creating this new framework, abbreviated to PROPHET (Pedagogic Realignment with Organisational Priorities and Horizon Emergent Technologies) creates a 360-degree view of emerging learning futures advocated by Salmon and Asgari (2019).

Design of the visual model

Our starting point in designing the visual model was Beetham's (2004) E-Learning and Pedagogy Programme created on behalf of the Joint Information Systems Committee (JISC). Beetham attempted to bring together the plethora of existing models and frameworks that defined HET into six categories: theoretical accounts, taxonomies and ontologies, practice models, standards and specifications, organisational models and practical accounts. We further analysed these categories and identified that they too could be organised into two overarching classifications; those that are pedagogy focused and those that are education planning focused. The six categories were organised into the classifications as follows:

- Pedagogic Classifications – Theoretical accounts, taxonomies and ontologies and practice models;
- Education Planning Classifications – Standards and specifications, organisational models and practical accounts.

These classifications provided a prototype of the visual model with horizon scanning added and placed centrally, crossing the boundary between educational planning and pedagogy (Figure 3). The visual model was then tested through four phases of its development.

Figure 3. A practice orientated framework to support successful higher education online learning (Shaw, 2018)

Pilot test 1: Evaluating the visual model within a HEI

The first test of the visual model took place within our higher education institution's (HEI) online learning department. Our HEI decided to create a specialist department dedicated to this mode of delivery, with academic specialists that understood the concept of horizon scanning. We used the classifications to evaluate our existing educational technology and consider HET to support its online learning offer.

The visual model was used by stakeholders in focus groups to scope out the Department's online strategy and create a shared understanding. This concluded with an agreed set of design principles that were approved by Academic Board (Sutherland et al., 2013). Changes were made concurrently to the HEI's regulatory framework, IT policies and teaching and learning strategy.

The visual model provided institutional evidence of its value by establishing sound initial design principles, leading to amended policies and an expansion of the HEI's online offer. Between 2011, when the model was introduced and 2017, the number of students studying online programmes grew by 18.5%. The visual model proved instrumental in helping stakeholders evaluate their infrastructure and pedagogic approaches in line with HET and by capturing and analysing the

themes from the focus group sessions this enabled further refinement of the Department's online strategy.

Pilot test 2: Re-evaluating the visual model with a European audience

We took the decision to share the visual model with a European HE community. The initial visual model (Figure 3) was presented at the 2018 EDEN (European Distance and E-learning Network) Annual Conference (Shaw, 2018); the consensus from that engagement was that the model was comprehensive, but the language used to describe the categories was too complex.

Pilot test 3: Re-evaluating the visual framework with an American audience

Pilot test 3 took place at the 2019 EDUCAUSE ELI annual meeting (Shaw & Stone, 2019). The visual model (Figure 3) was presented in a workshop where participants were clustered in groups of 5. The workshop participants suggested that working clockwise from pedagogic approaches to education planning is ineffective when the HEI's educational planning intentions are not first established. They suggested that more planning questions are needed to be asked before technology is implemented. During the workshop category labelling was further refined and the participants suggested reordering the flow to create a funnelling effect commencing with the macro and concluding with micro-environment.

Pilot test 4: Re-evaluating the visual framework with a European and UK audience

The refined visual model replacing educational planning with Organisational Priorities, and commencing the flow (Figure 4), was tested again, this time with attendees of the 2019 EDEN Annual Conference (Shaw, 2019) and 2019 Advance HE Annual conference (Shaw & Green, 2019). The workshop participants were placed in groups of 5 and asked to discuss personalised learning and how this could be achieved with HET in their institutions. This time we placed the participants in purposeful groups, bringing educational planners together with pedagogues. This time the PROPHET Framework acronym was used for the first time. Working clockwise around the visual model provided stakeholders with an opportunity to express the potential value of HET from their perspective and engage in the cross fertilisation of ideas with other stakeholders, dynamically across multiple HEI levels.

At these two events the conversation flowed more easily, and participants commented on the support that the visual model provided in facilitating meaningful conversation to think about issues outside of their normal sphere of work. Additionally, participants at the 2019 EDEN Annual Conference suggested that the visual model has the potential to be applied in other educational settings outside of the HE sector, for example, embedding it within Belgium primary school teacher training programmes.

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Figure 4. Relabelling and reordering the visual model

Crossing the conceptual threshold

At the end of the workshops, the facilitators summarised with a set of confirmatory questions. These enabled stakeholders to evaluate their level of agreement and their readiness to move to the next phase, both from a policy and design perspective.

The group were asked to articulate:

- Agreement on the factors that were influential in deciding that the HET is of low/high value in an HEI setting;
- Agreement that the HET was debated from different perspectives;
- An evolved vocabulary that all stakeholders understood;
- Agreement on policies that would need reinforcement or amendment;
- Agreement on a set of initial design principles.

Simplifying and reorganising the classifications has enabled a common understanding to emerge; the old labels were transformed to the new ones and the flow of conversation commenced with Organisational Planning (OP) and concluded with Pedagogic Realignment (PR) within each category Horizon Emergent Technology (HET) was discussed. With the visual model remastered (Figure 4), we took the decision to name it. Dynamic Multi-level Diffusion of Innovation (DMDI) is its purpose and it was named as such. It was then embedded within the three phase PROPHET Framework.

Results and Recommendations

Incorporating IAD and Design-Based Research models and embedding the new DMDI model, as illustrated in Figure 5, provides a three phase conceptual framework that brings together pedagogic

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realignment (PR) and organisational priorities (OP) with horizon emergent technologies (HET). The PROPHET Framework addresses the new conceptual vocabularies advocates by Morley (2012) and a disruption of the status quo and the need for a 360-degree view of emerging learning futures argued by Salmon and Asgari, (2019). By including the new DMDI model, the PROPHET Framework enables Rogers' (1995) DoI theory to become successful, expanding the degree of homophily; learning lessons from peers to reduce uncertainty about the advantages and disadvantages of the innovation. With a shared understanding stakeholders cross the conceptual threshold recommended by Meyer and Land (2005).

During the third phase the PROPHET Framework establishes a reduced set of "Design Principles", ready to test the HET with iterative cycles of implementation, applied research and policy evaluation. The first pilot test demonstrated how the PROPHET framework process and the visual model enabled stakeholders to evidence the impact of this approach several years later. Testing and relabelling the DMDI model with international stakeholders enabled the framework to become useful to HEIs more generally.

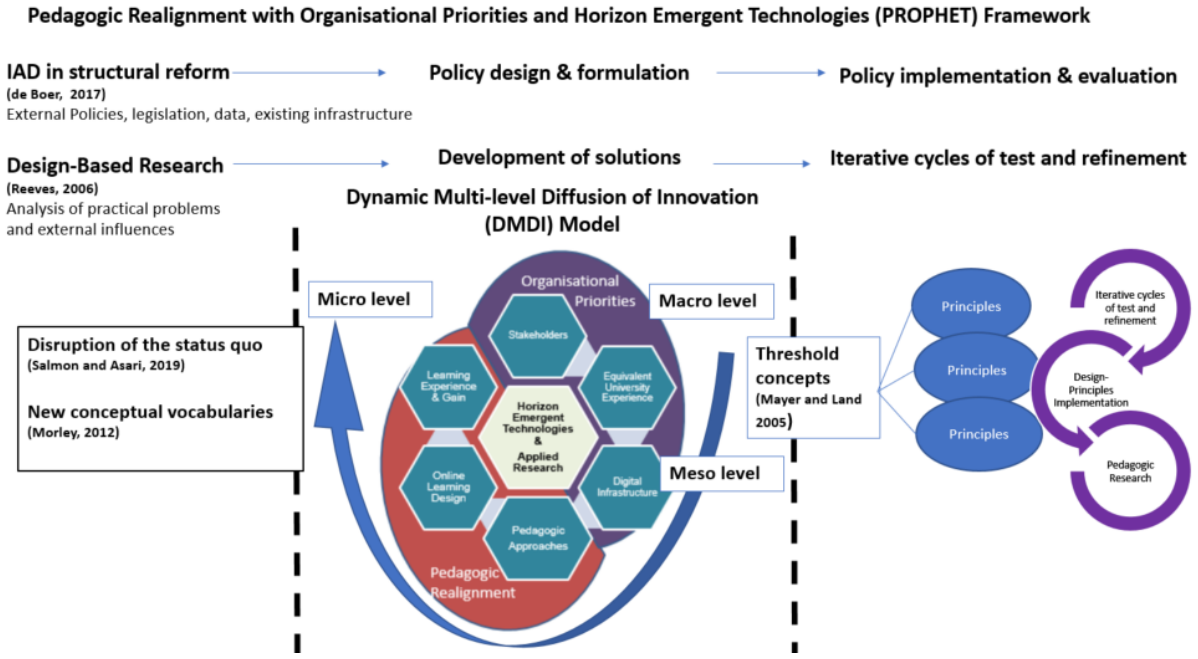

Figure 5. The three phase PROPHET Framework incorporating IAD in structural reform, Design-based research and the new Dynamic multi-level diffusion of innovation (DMDI) model.

An interesting finding from the pilot testing was the suggestion that the PROPHET Framework would be a useful tool to use in other educational settings, such as schools, to develop strategies for emerging technologies. It was also suggested that replacing HET in the centre of the DMDI model with another specific challenge, for example curriculum development, HEIs could use the tool for other strategic challenges.

A further recommendation was to "unbundle" the DMDI model to provide focus on a particular category. The complete DMDI model could then build the educational strategy over a period of time.

The study recognises that there are limitations at the second phase of the framework (the new DMDI model). The availability of a cross section of stakeholders required in workshops or focus groups to provide the 360-degree view of emerging learning futures can be difficult to achieve. A second limitation is the length of time it can take to establish a common understanding. It can be

challenging to achieve this in a single intervention. Furthermore, it is yet to be tested how the framework will aid other HEIs develop their appreciation of HET and whether the framework is effective in other educational environments.

Conclusion and proposals for further research

The new DMDI model brought together educational planners and pedagogues to establish shared design principles for a HEI's online learning strategy which resulted in a positive impact for student recruitment in one HEI. Over several years this innovation evolved, implementing a range of HET to support online learning. Changes were made concurrently to the HEI's regulatory framework, IT policies and Teaching and Learning Strategy and pedagogic approaches.

Refining the PROPHET Framework with international educational planners and pedagogues resulted in significant changes in both labelling and design, resulting in an effective framework to support dynamic multi-level diffusion of innovation discussions on Horizon Emergent Technologies.

The PROPHET Framework can now be tested using different strategic challenges such as curriculum design and be applied in other educational contexts such as schools. To address the time factor, stakeholders should look to apply an unbundled version of the DMDI model using select categories, to test a specific educational challenge. Outputs from such research will establish the degree of versatility that the framework affords.

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