**Towards a situative view of extending and scaling innovations in education – a case study of the Six Learnings framework**

Kenneth Y T Lim

Research Scientist, Office of Education Research, National Institute of Education, Singapore (corresponding author)

kenneth.lim@nie.edu.sg

+65 68969135 (Fax)

+65 96266808 (Phone)

David Hung

Professor, Office of Education Research, National Institute of Education, Singapore

Huang Junsong

Office of Education Research, National Institute of Education, Singapore

National Institute of Education,

Nanyang Technological University,

1 Nanyang Walk, Singapore 637616,

Republic of Singapore.

**Abstract**

This paper seeks to draw from contemporary understandings of translation science to highlight and elaborate upon possible norms and procedures which the authors have found to be critical in the successful extension and scaling of design-based research interventions in education into wider practitioner-based adoption and adaptation. The impetus for this interrogation is the desire to mediate the tensions which sometimes arise between researcher, practitioner, and other stakeholders in educational research – such as policy-makers and funding agencies. It is hoped that these explications will contribute to the as yet nascent body of literature on translation science as applied to innovation in education.

**Introduction**

The extending and scaling of research innovations in education has historically been viewed through the lens of multiplication (increasing numbers) and spread (increasing areal reach). In his work on the Diffusion of Innovation, Rogers (1964) defines innovation as any new idea, practice or object, and measures innovation diffusion in terms of the number of innovation adopters over temporal, social and spatial dimensions. Such a view of innovation-scaling is therefore product-oriented, in that the deliverables (performance indicators) of successful 'scaling' are defined according to strict numeric constructs (eg, the number of teachers, the number of schools, the number of school clusters etc). Another limitation of product-oriented innovation-scaling theories such as Diffusion of Innovation is that the process (rather than factors) in which pre-adopters make transitions through their participatory involvements in the community has not

generally been the focus of investigation. An often implicit assumption of this view is that these innovation 'products' are replicable *en masse* without undergoing (and, without the need to undergo) significant change from the original.

Such a view of scaling stems from a twentieth-century Fordist-production paradigm (as applied to traditional notions of Instructional Design). Such views are challenged by alternative paradigms such as Communities of Practice, in which social and contextual dimensions and people-activity interdependencies are foregrounded, thus supporting a process-oriented perspective. Such processes are enacted through shared codes of conduct, histories and cultures (Wenger, 1998)**.**

The purpose of this paper is to further our understanding of a process-oriented and situative view of extending and scaling innovations, thus recognizing the contextual fidelity of each translative iteration. This is with a view to the eventual development of a translation-scaling framework for extending technological innovations, with a particular view to the furtherance of such efforts within the education system in Singapore.

It is our contention that 21st century learning and literacies demand a fundamental rethink of such a framing of innovation-scaling. We echo Latour (1993) in proposing a more nuanced, situative view of innovation-scaling – one which explicitly foregrounds the local contextual factors and interplays within which all iterations from the original are embedded. To elaborate, a shift needs to be made from the strict multiplicative metaphor to what we term a 'resemblance' metaphor. We argue that inherent in such a resemblance metaphor is the explicit recognition that the extension and scaling of innovations arising from education-research is just as much a process as it is a product; and because innovation-scaling is a process, it is by definition not processes to be

replicated, but instead to be re-created / re-instantiated / re-enacted. Such instantiations and enactments take place in the *milieu* of the products of the innovation, namely artifacts and boundary objects. The latter form the substrate from which the dialectical interactions between product, process and participant-practitioner are lived and therefore reified. Going forward, it is our strong conviction that such a framing of the extension and scaling of innovations will inform the direction of many education-research interventions in Singapore. Hence, subsequent re-instantiations from the original are not reproductions but re-creations which have resemblances to the original.

**Review of Literature**

Translation science is relatively young. Academic papers and research reports with an explicit focus on translation seem to have been published in any significant numbers only since the turn of the present century. Much of this early body of literature has arisen from research into issues regarding the translation of research into practice in the related fields of medicine, pharmacology, the health sciences and health education. Because the field is still new, its nomenclature and key notional definitions are still very much a contested space. It is critical, therefore, that any macro-socio-political system that seeks to foster translation should at least seek to establish common shared understandings among all stakeholders from as early a stage as is practicable. Notwithstanding the preceding argument, implicit in any conceptualization of translation is the notion of bridging across heterogeneities. Expressed another way, once a given research intervention is extended and scaled to any significant degree, it is more likely than otherwise that the socio-cultural contexts within which these subsequent iterations of the

intervention are embedded will differ from those of the original. Coburn (2003) makes this very point – that is to say (taking some paraphrasing liberties), scale is more than just the number of schools. Instead he suggests that other performance indicators of scale (with regards research innovations) include the nature of the change envisaged, the degree to which it is sustained, and the degree to which practitioners have the knowledge, authority and capacity to evolve the original intervention over time. Coburn therefore argues that discussions of scale must be broadened to include the dimensions of depth (in terms of shift in beliefs, norms, and / or pedagogical principles), spread (both outward from, and inward within schools), and shifts in reform ownership. Together, these three dimensions circumscribe a fourth – namely, sustainability – which he acknowledges to be beyond the locus of design control of any single intervention or research team, as this latter dimension speaks towards long-term systemic change. Of note is that these dimensions are process-included where mindsets and 'soft' capacities are developed in the social contexts of subsequent iterations.

In light of the afore-mentioned considerations of context-heterogeneity, Thompson and Wiliam (2008) have cautioned about the tension between the wish to maintain fidelity with the original research design, with the need to be flexible about each successive iteration thereof. Their mantra of "rigour without rigidity" speaks through a glocalised lens as it calls for the research-practice community to stay focused on specifics while "sweeping in the place-based particularities". Because of the challenges inherent in managing these tensions, they frame as critical the need for common understandings by all (local) stakeholders of any given intervention not only of the theory of action itself, but also of what is *not* part of it; in their view, explicating what is not part of the theory of

action facilitates informed decision-making about what can and cannot be relaxed "in the face of contextual challenges". These explications need to be clearly codified for the benefit of all members of the research-practice community.

Several prominent figures in translation science have echoed this view, including Croyle (quoted in Glasgow and Emmons, 2007) and Schillinger (2007). Croyle, for instance, has called for the research-practice community to design for "the minimal intensity needed for change", advocating Rose's (1992) position that a population-based approach ("multiple contacts over time through lower-cost strategies") has been consistently demonstrated to be more effective at achieving sustained change across a population than intense, selective, 'boutique' projects conducted within a micro-localised homogenized target population. Glasgow and Emmons (2007) has spoken very clearly that "intensive costly interventions and highly selected participants reduce the generalisability of the study and the likelihood of translation". As such, he cautions strongly against researchers placing too much of a design premium of efficacy of the original intervention, at the expense of external validity. Schillinger (2007) acknowledges that such paradigmatic shifts would not occur overnight, and need to be encouraged by a corresponding shift in understandings by both funding agencies and grant reviewers. Such views are not discordant to situative stances and they emphasize that we should not overclaim situativity (and hence micro-localized homongenized target populations) in which spread through lower-cost strategies are possible without compromising rigour.

In translation literature, it is generally accepted that there are two broad thrusts of translation (Institute of Medicine's Clinical Research Roundtable, Sung *et al*, 2003).

These are, namely, translational research (T1) and translation research (T2). T1 refers to deductively-derived research interventions, which have been enacted within relatively homogenous and resource-rich contexts. T2 refers to the dissemination, implementation, and diffusion of T1 research into community-practice and policy (eg, Narayan *et al*, 2000 and Schillinger, 2007). In turn, dissemination refers to how the targeted distribution of information and intervention *materials* can be successfully executed, implementation can be thought of as referring to the implementation of content (the interpretation by practitioners of the research evidence and of the codified intervention) within a given (political / professional / socio-economic / organizational / attitudinal) context, through the process of enacting and engaging in strategies for change in (and, and) management practices. As for diffusion, the lens is turned on the *factors* for successful adoption of the intervention which results in widespread use by the target population. Such 'successful adoption' can be further analysed in terms of the uptake of the practice and / or innovation, as well as in terms of the penetration of broad-scale recommendations through dissemination.

Thompson and Wiliam (2008) have contributed towards the discussion of factors by reminding the research-practice community to have "a clear idea of what you are trying to enact and why it is worthwhile". Self-evident as such a reminder might seem to be, implicit in it is the caution that time and effort needs to be invested in initiating and maintaining dialog within the community to build a shared vision (Senge, 1990). While it may be a truism, the point is worth making that such dialog should indeed be multilaterally-defined and not monologic. Each member of the respective researcher-practitioner community should be aware of and acknowledge his or her own biases and

level of objectivity about this critical tension, so that the contextually appropriate balance between fidelity (to the theory of action) and flexibility be striven for and (eventually) attained. Lewis *et al* (2006) speak to this very issue when they called for a clear articulation of the specification and tools (coherent with the theory of action of the given intervention) in order to support the building of practitioner capacity and expertise. They make the point that this articulation is necessary because of the risk that the surface features of an innovation may sometimes obscure the actual enaction of the theory of action.

Unlike translation science, diffusion research can trace its roots into the mid twentieth century. Kroeber (1940) and Hägerstrand (1967) have written extensively on the matter, and of particular relevance to the present discussion is the reminder that diffusion need not necessarily be assumed to originate continually from a single, authoritative source (expansion diffusion), but can also take place through other models such as through contagion and hierarchy. In this regard, consideration should therefore be placed on the dispositions of the change agents, particularly according to Rogers's (1964) characterizations of innovators, early adopters, the early majority, the late majority and laggards. Elaborating, Rogers recognizes that innovators are venturous and 'cosmopolites' who may not necessarily be well respected by other members in a local system. By contrast, early adopters are somewhat more 'localite' and have the highest opinion leadership in their systems. They are well respected by their peers and are generally in a central position in the communication networks of the system. The early majority takes relatively longer than in their adoption decision-making process. They interact frequently with their peers but seldom hold positions of opinion leadership in

their system. In contrast, the late majority make adoption decision based on both economic necessity and the increasing peer pressure and social norms. Finally, laggards are the most localite in the system. They primarily interact with others who have relatively traditional values. They tend to be suspicious and their adoption decision tends to be lengthy.

Given the preceding description, it is therefore critical to acknowledge that T2 requires a different set of research skills than T1 (Woolf, 2008) – again, this has implications on policy-makers and the grant-review process. Above all, T2 is predicated upon trust between the researcher and the practitioner, because the analytical lens of T2 is the process by which discoveries and innovations are moved to sustained adoption. Such trust can be fostered by the active involvement of the practitioner at all key stages within the design process. In Singapore, this has implications for (but – equally – can leverage upon) existing efforts in schools on Action Research.

What might some key performance indicators of T2 be? In the translation literature, Glasgow's (1999) articulation of the so-called RE-AIM framework has been frequently cited and speaks authoritatively to this question. The RE-AIM framework was explicitly designed from the outset to be an evaluation framework for translation. It describes five dimensions, which operate at either (or both) the individual and organizational levels. At the individual level, the success of any given translation effort can be evaluated against the criteria of Reach (into members of the target population), Effectiveness (ability of the intervention to do more good than harm in a real-world setting (contrasted with Efficacy)), and Maintenance (in individuals over time). At the organizational level, the success of any given translation effort can be evaluated against

the criteria of Adoption (by target settings and target institutions), Implementation (consistency across programme components and members in terms of the afore-mentioned aspects of content, context and process) and Maintenance (in populations over time; implicit in this notion of maintenance are both sustainability of the innovation / intervention and the adaptation thereof). The RE-AIM framework is extremely helpful because it is accommodative enough to provide policy-makers and programme evaluators with an evaluative structure against which to compare (in a fairly objective manner) potentially very different interventions. Potentially, weights could be applied to the five dimensions in order to reflect the priorities and imperatives of policy and funding. To the present author's mind, this point cannot be over-emphasised.

**Managing Mutations – the Intermediary Phase between T1 and T2 Translation**

Summarizing from the preceding literature review, a process-oriented translation approach does not preclude the role of products and other codified forms of reifications. Based on our experiences in Singapore, innovations – be they pedagogical and / or technological – begin usually as research initiatives / projects. These research efforts can be broadly construed as T1 efforts.

Many such projects adopt design-based research methodologies, implying that researchers and practitioners in school-based innovations co-construct the agenda of the entire intervention. Arising from these interventions, there is an emergent recognition that for T2 (extension and scaling) to occur, it is necessary for there to be people-preparation and foundational tenets described through a sufficiently well-specified and articulated set of codifications in the form of design principles, norms, and procedures.

Table 1 is a representation of such an understanding of translation design illustrated by way of the example of an ongoing funded intervention in six schools in Singapore, in which the corresponding author is the Principal Investigator. Specifically, the intervention leverages the affordances for learning of the fictive world of *Second Life*. Initially conceptualized as a learning intervention for 14- and 15-year-old geography students in a single school, the project was extended and scaled over the course of 2010 to fourteen classes, including students from two grade-levels younger, over a spread of schools, and into subjects such as chemistry and mother tongue. The details of this case study will be described in subsequent sections of this paper, in order to illustrate key success factors for such translation across age-cohorts, ability-levels, geographical- and cultural-spread, and disciplinary understandings.

Table 1. Three stages from Research Projects to Extension and Scaling

| Stages | Tenets | Key translation issues | Illustrations from the *Second Life* case |
|---|---|---|---|
| Seeding Research Projects (T1) | Research projects need to perturb the status quo of current pedagogical and learning practices<br><br>Researchers engage with practitioners in co-designs and implementations throughout | - How do we identify research projects which have the potential for extension and scaling?<br>- What are the criteria?<br>- How do we design research projects with translation, extension and scaling in view? | (Not applicable in the context of the case. Nevertheless, funding bodies might wish to incorporate design-specifications for scaling as part of the obligatory requirements for funded projects.) |
| ***Deliberate Structuring for Extension and Scaling*** | Before extension and scaling can take place, there needs to be an intentional phase needed to dialogue and think through issues that would surface in extension and scaling efforts. These issues include IP matters, adequate preparation of the people involved in extension and scaling, testing out the adequacy of the specifications of design principles and related resources, and others.<br><br>Seeding a community of stakeholders who understands the translation efforts | - How can research designs be extended out and scaled up in different contextual situations?<br>- What are the key strategies for re-iterating?<br>- What are the inter-relating factors leading to extension and scaling?<br>- What are considerations need to prepare for extension and scaling?<br>- What product issues need to be put in place?<br>- What process preparations are needed?<br>- What criteria do we employ to determine readiness for extension and / or scaling?<br>- Who should these initial stakeholders be (e.g., innovators) in the seeding process of the community? | A common curricular design framework was identified (the *Six Learnings* framework, Lim (2009)).<br><br>This framework was shared, and dialogued about extensively by all key stakeholders several months before any planned learner-sessions.<br><br>The framework itself was permitted to evolve – in consultation with the Principal Investigator – as inputs from various learning-cultures and disciplinary-understandings came in. |
| Extension and Scaling (T2) | Scaling begins when translation issues have been piloted and design specifications tested and diverse populations would likely interpret these resources in appropriate ways.<br><br>Sustaining the community | - How can we engage in extensions and scalings which are legitimate?<br>- How do we evaluate the successful efforts in extension and scaling (RE-AIM)?<br>- How do we deal with lethal mutations?<br>- How do we plan for sustaining the community?<br>- Who (eg, early adopters?) should we be reaching out to in order to enthuse new membership into the community? | Please refer to text within this section of the paper on:<br><br>- embodiment;<br>- codification;<br>- dialogue; and<br>- brokering. |

The row in Table 1 which represents the necessary principles, norms and procedures that catalyse successful T2 efforts is the very area that we see as the primary contribution of this paper to the translation of educational policy into educational practice. As such, given that – from the Review of Literature – T1 and T2 have already been well elucidated in translation science, the remainder of this paper represents an initial attempt at elaborating on what we have identified as a critical intermediary phase for successful transitions from T1 to T2.

It is our argument that adequate consideration of the norms and procedures which characterize this intermediary phase must be paid – by all stakeholders – lest the risk be run that prototypes be extended or scaled without the necessary understandings of how they are to be appropriated in ways that deeply embrace the philosophical underpinnings of the design principles arising from their respective theories of action in the first place.

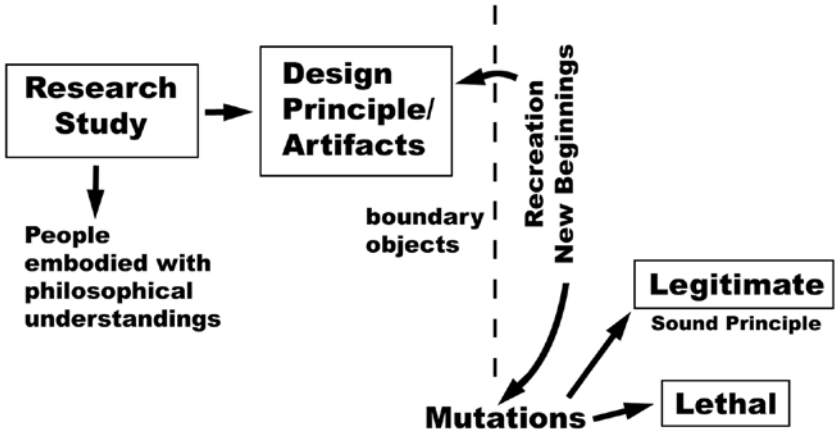
It is an understandable apprehension of researchers who purport process-orientations that their codified products get lethally mutated (Brown and Campione, 1996) from their original intentions. Such adaptations are considered as having been mutated 'lethally' in that they "no longer capture the pedagogical essence of the innovation" (p. 6). Brown and Campione go on to elaborate that sustainable and productive innovation "requires understanding how and why an innovation works within a setting over time and across settings, and generating heuristics for those interested in enacting innovations in their own local contexts".

Using the metaphor of re-creation and resemblance – rather than one of reproduction – we suggest that mutations are inevitable; and indeed desirable and healthy. This is because to be philosophically situative, every recontextualization effort

cannot be identical to previous instantiations since any social context is chaotic (Poincaré, 1890) and unpredictable.

It thus follows that the issue is hence not about mutations *per se*, but is instead the extent to which these mutations might be considered lethal. To elaborate, it is helpful to consider lethality relative to the original as a frame of reference. Given our suggestion that mutations are inevitable, the criteria for judging mutations should be whether they are legitimate rather than lethal. By legitimate, we suggest that the mutations are within sound learning principles broadly specified rather than very specific design principles nearly consistent with the original design specifications of the research project. The preceding discussion can be summarized by Figure 1.

Figure 1. Representation of translation and extension / scaling innovations



From Figure 1, it can be seen that central to our representation of translation design are four principles. These are, namely:

***Translation Principle 1: Embodiment***

By embodiment we refer to the intentional design for people (researchers, practitioners, brokers) to take an active part in the actual social participation of the research project and the subsequent instantiations. Through embodiment, participants develop both explicit reifiable knowledge and the implicit understandings that may not necessarily be made explicit through language (a notion similar to the map not being the territory).

Thus, in the case of the *Second Life* intervention, care was taken to conduct familiarization sessions, hands-on experiences, needs-consultation through on-site school visits, focus-group discussions, and lesson-planning workshops as early as six months before the actual start-date of any in-world activity by the learners themselves. These face-to-face and online interactions were grounded upon emergent understandings of the common curricular framework underpinning the original intervention – namely, the *Six Learnings* framework (Lim, 2009). In turn, this same curricular design framework co-evolved with the increasingly diverse instantiations of it, within the various school-settings.

For example, the original intervention was designed along the metaphor of a virtual fieldtrip along the course of a river, primarily because in highly urbanized Singapore, the natural hydrological basins have all been canalized (concretised and straightened). As teachers from other subject disciplines opted in to the project, conversations used this fieldtrip metaphor as a launching point from which to explore other affordances of the virtual environment, such as the ability to simulate variations in

temporal and spatial scale (for studies in molecular structure in chemistry), and the way the immersive nature of the environment catalyses authentic role-play (for language-learning). Teachers new to *Second Life* were able to think meaningfully about these affordances once they themselves opened their own avatar accounts and started spending time in-world, thus experiencing the principle of embodiment at first hand.

***Translation Principle 2: Codification***

These dialogic sessions with stakeholders highlighted the need for codification of the design principles which arise from the research study. Thus, in the chosen case described, not only were classroom- and lab-based sessions recorded as audio and video, but – critically – so were post-intervention debriefing sessions with students; these records were supplemented by examples of authentic student-generated artifacts (both digital as well as analog). An example of such a digital student-generated artifact is given in Figure 2, which represents a river-basin terraformed by a group of four fifteen-year-old geography students from a state-funded school.

Figure 2. Example of drainage basin terraformed by novice geographers in *Second Life*

The particular basin depicted in Figure 2 was instructive because geography teachers recognized the teachable moment which the technology had presented, by surfacing novice (mis)understandings about the process of formation of an ox-bow lake (the ox-bow lake has been terraformed by the students, but has been formed in such a way that its site and situation is not geomorphologically authentic to the overall context of the entire drainage basin).

Using this and other similar artifacts of learning, it was much easier for subsequent batches of teachers and curriculum designers to be confident in staying true to the original design principles, in that when attempting to adapt the intervention to their local curricular contexts, the primary affordance that was foregrounded was not the (more common) use of *Second Life* as an environment for distance-learning, but instead was its use as an actual canvas on which learner pre-conceptions, implicit biases and misconceptions could be surfaced in ways which were authentic to the learners

themselves. Importantly, to reduce the likelihood of lethal mutations, the people who take these products forward need to have a sensible and consistent understanding of the philosophical underpinnings of the original project. This cannot be achieved through traditional notions of 'sharing sessions' infrequently organized among schools, but should instead be structured through exchange programmes / mentorship programmes.

***Translation Principle 3: Dialogue***

Such exchange / mentorship programmes are the crux of dialogue, by which is meant the need for participants, whether in the original research project or in subsequent instantiations, to constantly enter into conversations around the reifications constructed by the research project and in the translation efforts. In the chosen case described, such dialogic interactions took place over the course of 2009 and into 2010, and are ongoing. Participants in the process include policy-makers from the Ministry of Education, Singapore, district-level Master Teachers, technical development- and support-staff, Newly Qualified Teachers, senior- and middle-management Heads in schools, and the Principal Investigator.

Through the process of dialogue, misconceptions were explicated and understandings advanced; in particular, contested understandings were resolved through the lens of the original curricular design framework of the *Six Learnings*. Participants newer to the process were also gradually enculturated through interaction between different members of the research-translation community. The key thrust was in involving stakeholders from the start with a view to establishing shared language and understandings through boundary objects (such as the learning environments and tools within *Second Life*). These shared understandings ensured that translation was locally

relevant, and that outcomes were meaningful to practitioners (Glasgow and Emmons, 2007).

***Translation Principle 4: Brokering***

Finally, brokers are those who mediate and enable others who are able to deeply articulate the goals and philosophies of the original research project (on the one hand) and the subsequent uptake by individuals who appropriate the design principles and resources (on the other). Brokering is needed to bring diverse groups of people together who – because of their differing philosophical trajectories – may not necessarily be readily thought of by the other as holding potentially similar levels of specificity with regards their respective epistemological stances. In the chosen case described, it was found that Master Teachers – who have been recognized for their experience in pedagogical design and disciplinary understanding – were well placed within various socio-political contexts to perform such a brokering role effectively.

In the context of 21st century New Media literacies, there is increasing recognition that such brokering performances go beyond notions of the apprenticeship model typified by Vygotsky's (1978) Zone of Proximal Development. This is because the traditional characterization of the expert-novice dialectic fails to adequately capture the dialogic and emergent interactions that are afforded by the sociologically flatter structures of learning environments designed around digital media. Because they have been given the mandate to operate at the level of the school-district rather than at that of the individual school, Master Teachers in Singapore are well-placed to speak across the otherwise politically-silo-ed paradigms of traditional spatially- and temporally-construed boundaries of schooling.

**Implications for Policy**

To reiterate, it is recognized that design-based research involves practitioners at an early stage. Care needs to be taken that such practitioner-involvement is not enacted in a monologic way, but through true dialogue arising from mutual trust and respect. Even with embedded translation and the design principles reified, there is still a need to extend the dialogic conversations to subsequent stakeholders on the potential challenges and issues (such as Intellectual Property rights) so as to build towards future extension and scaling.

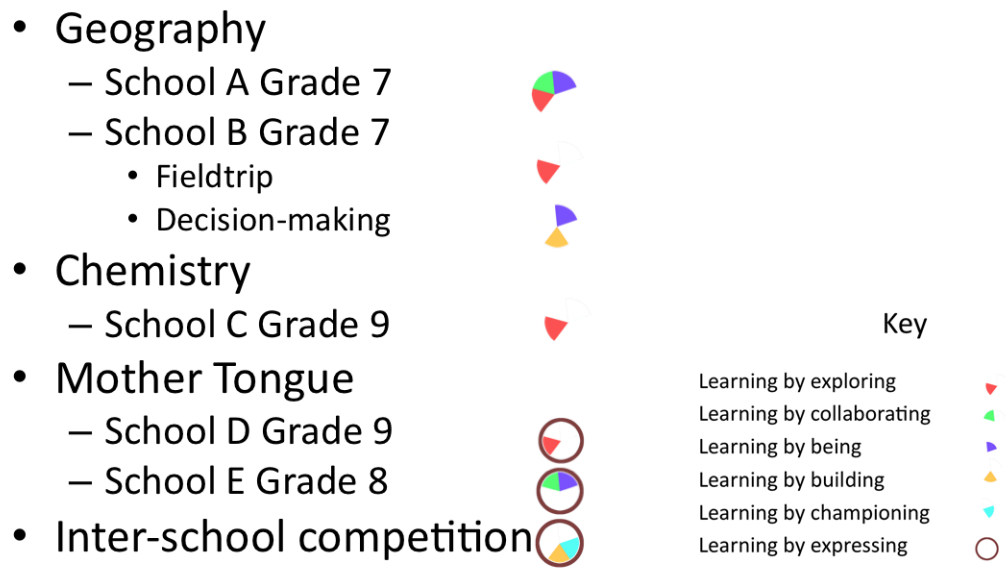
In the extension and scaling efforts, deliberate efforts should be made towards seeding for a research-practice community as a structure to engage the participants with the various context-instantiations. All stakeholders bring to the table their respective disciplinary understandings and values. Brokers are present to mediate these axiologies such that they are mutually honoured by all parties. It follows that human factors are key to successful translation. We have found that effective strategies to enculturate people include

- involving stakeholders in co-analysis and co-design from the start:
    - iterations of the design-development programme;
    - planning for curricular enactments;
    - planning for professional development;
    - working towards mutual benefit for all stakeholders (including cognizance of local issues and concerns);

    - building towards mutual trust and respect (no single member should have ownership of the data, nor of its interpretation);
- establishing shared language and understandings through boundary objects (design artifacts):
    - clear articulation of design principles; and
    - clear establishment of the boundaries of immutable features of the intervention (addressing 'flexibility vs fidelity' through 'rigour without rigidity');
- seeding and incubating a community of researchers, practitioners and brokers to augment translation:
    - building on strengths and resources within the community (Israel *et al*, 1998); and
    - bearing in mind that while the community may be a global collective, translation always needs to be locally relevant, by which is meant that outcomes must be important to practitioners and must be seen as feasible and addressing issues of local concern (Glasgow and Emmons, 2007).

Taken together, these strategies have resulted in a trajectory of scaling from the original – geography-based – intervention in *Second Life*, to a variety of interventions across schools, age-cohorts, and subject disciplines, all grounded upon the common set of design principles described by the *Six Learnings* framework. The utility of the framework to the successful scaling of these interventions is summarized in Figure 3.

Figure 3. Summative representation of scaling within the *Six Learnings* framework




In terms of the three-stage conceptualization proposed in this paper, this deliberate structuring for extension and scaling is a necessary follow-through upon the completion of the initial research project. Deliberate plans should be made to expand the pool of stakeholders in order to complement efforts to foster a deeper sense of Bakhtinian dialogism as a lens for critical inquiry.

**Summative Remarks**

This paper has been framed as a positional statement of present understandings of translation, extension and scaling, as held by its authors, in their respective institutional

contexts. It is acknowledged that the nascent nature of translation science renders the expectation of any definitive conclusions both unhelpful and unrealistic. Instead it is hoped that the ideas presented here will form a common substrate upon which conversations about these very issues may emerge and be sustained, and eventually serve as a conceptual impetus for policy makers to consider the complex structures and processes which need to be considered if system-level decisions are to be made for the successful and effective diffusion of research innovations.

Taken together, it is envisaged that the strategies outlined in this paper will go some way towards illuminating what is as yet an amorphous and evolving ecological space which draws its impetus for growth from the research-practice nexus. It is also hoped that this paper builds on Rogers's (1964) work by drawing attention to the product-process dialectic, foregrounding the latter while not discounting the former. In this way, we are informed by the increasing number of post-modern socio-cultural *milieux* in which scaling is far more a trans-contextual phenomenon than what was afforded to Rogers in the 1960s.

We have chosen to stress the importance of people and stakeholders as a key dimension in successful translation efforts. By arguing for a community-based approach to augment translation efforts, we have proposed a social participatory process complementing the traditional product-oriented scaling models. We see this as another significant contribution of this paper to the literature. We frame such a community as central to the success of re-creating resemblances and legitimate mutations relative to the original research innovation.

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