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This is the peer reviewed version of the following article:
Helen Askill-Williams & Gloria A. Koh (2020) Enhancing the
sustainability of school improvement initiatives, *School
Effectiveness and School Improvement*, 31:4, 660-678,
DOI:10.1080/09243453.2020.1767657

which has been published in final form at
<https://doi.org/10.1080/09243453.2020.1767657>

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Enhancing the sustainability of school improvement initiatives

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Abstract

Schools address students' educational needs by delivering a range of traditional and innovative programs. Selecting, implementing and sustaining a new program is a school improvement initiative. Despite investments of (often) substantial resources, many such programs have relatively short school lives. Effective educational initiatives need to survive in order to continue to deliver personal, social and economic benefits. However, practical guidance for sustainable implementation of new initiatives in school settings is relatively lacking. Drawing from literature and interviews with 70 school leaders and teachers, we created and delivered to 10 educational sites a self-assessment site improvement tool. Principal components analysis identified 20 components and feedback from sites indicated the practical usefulness of the tool. Adopting a systems perspective with explicit attention to interactions between goals, processes and emerging outcomes has the potential to generate more thorough consideration of the range of components that influence sustained program implementation leading to site improvement.

Key Words: Sustainable implementation; complex adaptive systems; school improvement; evaluation

Introduction

Schools address students' academic, social and emotional educational needs by delivering a diverse range of traditional and innovative programs. Examples include new pedagogies in traditional subject areas, such as literacy and numeracy; promotion of student wellbeing; bullying prevention; and a range of health education programs such as nutrition, drug and cyber education. Often these educational initiatives flow from Government policies (e.g., The

National [Australian] Roadmap for Mental Health Reform); are supported by Government Research Councils, Government Departments and NGOs; and/or have substantial public, philanthropic and charitable funding allocations.

Allowing schools the flexibility to diversify their curricula to meet the learning needs of their students and the values of their school community is consistent with good educational practice. To address these broad curricula responsibilities, school leaders and teachers draw from a huge range of resources, some of which are commercially driven. Sometimes these initiatives are advertised on school websites. For example, Tatachilla Lutheran College (2020) promotes a focus on student wellbeing, and advises that they use commercially available programs such as Bounceback in the junior school, and a Wellbeing Bank of tools in the middle school. Meanwhile, Brighton Secondary School (2020) advises that it embeds Positive Education strategies across the school (such as zest, love and hope).

School leaders and staff invest substantial personal and economic resources in such locally selected curriculum initiatives. Costs can include time spent reviewing and selecting programs; advocating for the program to staff and the school community; purchase of materials; sponsoring visiting speakers; staff professional education; and curriculum time.

However, there are concerning reports about poor program sustainability once start-up enthusiasm and resources are exhausted (Devaney, O'Brien, Resnik, & Weissberg, 2006; Greenberg, Domitrovich, Graczyk, & Zins, 2005; Scheirer, 2005). For example, Elias, Zins, Graczyk, and Weissberg (2003) reported that implementation of an evidence-based social-emotional curriculum was sustained in only six of 14 start-up sites five years after its introduction. The number of schools delivering all or even parts of the Social and Emotional Aspects of Learning (SEAL) program in the UK has dropped considerably in recent years. SEAL was archived in 2011 following mixed evaluation findings. Some of the difficulties with SEAL were demonstrably poor fidelity to program goals and variation in pedagogical approaches. Poor attention to components of sustainable change also impacted SEAL outcomes (Humphrey, Lendrum, & Wigelsworth, 2010; Wigelsworth, Humphrey, & Lendrum, 2012, 2013). Similarly, a follow-up survey of 100 trial schools in the highly-resourced KidsMatter: Primary schools mental health promotion initiative in Australia revealed that one in five schools reported they were either no longer delivering the initiative at all, or delivering only parts of it, only one year after its initial introduction (Author, 2017).

Furthermore, evaluations of program success and (more rarely) sustainability are typically conducted on the program (not the school system), and address limited-duration student outcomes or fidelity of program implementation:

Very rarely are follow-up assessments conducted with teachers in order to evaluate the maintenance of improved teaching quality or sustained use of evidence-based curriculum components after the intervention trial (Bierman et al., 2013, p. 1194).

Literature from the field of prevention science is definite in its advice that effective initiatives need to survive in order to deliver personal, social and economic benefits (Cooper, Bumbarger, & Moore, 2015; Gruen et al., 2008; Pluye, Potvin, Denis, Pelletier, & Mannoni, 2005). In particular, Cooper et al. advised that proven-effective programs are unlikely to have an impact

if they are not sustained beyond start-up funding, which by design is time-limited. Fixsen et al. (2005) also observed that time-limited implementation leads to time-limited impacts.

Definitions of Sustainable Implementation

Various definitions of sustainable implementation appear in the literature. The term long-term success was used in place of sustainability by Lennox, Doyle, Reed and Bell (2017) in an attempt to find words that resonate with practitioners. Lennox et al. defined long-term success as,

a dynamic process where staff and others involved have the capacity and capability to monitor and modify activities and interventions in relation to the health benefits they wish to achieve and in response to threats and opportunities that emerge over time (p. 2).

Process terms such as maintenance, institutionalisation, integration, and routinisation are also used (Wiltsey Stirman et al., 2012). Cooper et al. (2015) chose the alternative word sustainment to describe continued program implementation for two or more years beyond the start-up funding phase. Those authors used the term sustainability more broadly to describe the capacity or potential to achieve the goal of sustainment. Cooper et al's use of different terms to differentiate day-to-day program maintenance from more fundamental components that underpin sustainable implementation accords with the complex systems direction of this paper, although the two different words, sustainment and sustainability, potentially cause confusion.

At the core of a definition of sustainable implementation is the concept of change over time. The interpretation of a sustained period of time depends on context. It might be over a five-year strategic plan in a school, or one year in a single teacher's classroom in response to a particular class's needs. It might be one term of strategy instruction for a single student, such as a social skills intervention, but that same intervention might need replication with many students as they each reach the appropriate developmental level. If a system does not change to enable the client or student need to be satisfied, the initiative has not been successfully sustained.

Summarising all of the above, for parsimony and for the purposes of the systems perspective taken in this paper, sustainable implementation is defined as the implementation of an effective initiative over a context-dependent timeframe leading to irreversible desirable system change.

Sustainability in Practice

During our research team's preliminary discussions with education leaders it became clear that the short life of some educational initiatives is a highly salient problem in schools. The leaders all volunteered examples of where programs had been introduced with substantial financial and human investments, but sustaining those programs had proven difficult. Sometimes the causes seemed obvious, such as loss of financial support, or loss of the key person driving the initiative. At other times, reasons for a program's demise seemed obscure. Without such knowledge, it is difficult to plan to avoid future problems with sustainability.

If we are to truly achieve sustained [public health] impacts, sustainability of proven-effective programs is critical..... Despite increasing recognition of the importance of research in this area, we still have insufficient knowledge about sustainability, particularly in natural (i.e., non-research) settings.... To

provide the necessary technical assistance and support to implement and sustain these programs with success, we must understand better the factors that facilitate and support long-term sustainability (Cooper et al., 2015, pp. 145-146).

In this paper we identify components related to the long-term sustainability of educational initiatives in natural school settings. We draw from two fields of enquiry, school improvement and prevention science, to create a practical self-assessment site improvement tool, namely, SITE (Sustaining Innovation Through Education). SITE conceptualises the introduction of a new program or initiative, (such as a student wellbeing program), as a site improvement action within a complex adaptive system. SITE includes measures of concepts such as contextual relevance, future planning, local culture and the influences of various actors that impact program sustainability.

The research described in this paper can be understood in terms of Spoth, Randall, and Shin's (2008) "Type 2 translation research" in their Translation Science to Population Impact Framework. Type 1 translation research investigates program efficiency and effectiveness. Type 2 translation research undertakes close investigation of the systemic processes and structures that enable programs to be embedded, sustained, and scaled-up. Spoth et al. argued that there is very little reported Type 2 research because it typically requires investigations of program aspects, such as systemic processes and human interactions, that are outside typical funding cycles and evaluation criteria (such as short-term effectiveness and fidelity). Furthermore, close investigations of systemic processes and human interactions are typically not of the randomised controlled type of research. In education, as in health promotion, such controlled trials are often not practicable:

Although randomised controlled trials of individual-level interventions are relatively straightforward to do, it is often impossible to randomise a population-level intervention, such as the introduction of a national tax on sugar-sweetened beverages, or the multiple factors that support cycling, such as physical infrastructure, spatial planning, and integration with public transport. Approaches to research that aim to understand single components within systems, or attempt to factor out the system context using randomisation and control, are thus of limited use for identifying how to influence complex systems to achieve improved population health and wellbeing (Rutter et al., 2017, p. 2602).

From a systems perspective, Rutter et al. (2017) advised that, instead of asking whether an intervention leads to a desirable outcome, we need to ask if and how an intervention contributes to reshaping a system in favourable ways. Mason (2009) summarised that complexity is a science of emergence located in environments, organisations or systems with very large numbers of elements or agents connected to and interacting with each other in diverse ways. This systems perspective of sustainable school-improvement initiatives provides the foundation to this paper.

Method

Overview

The study described in this paper was of a mixed-method (qualitative and quantitative) design (Creswell & Plano Clark, 2011) that aimed to investigate sustainable implementation from diverse perspectives. The study proceeded through four overlapping phases. Phase one involved a scoping literature review to identify previous research into sustainable implementation and to assist in formulating interview questions for participants. Phase two comprised interviews with 70 school leaders, staff and education stakeholders to identify components of successfully sustained effective educational initiatives. In phase three the literature review and interviews informed the development of SITE. Finally, SITE was delivered to staff at ten educational institutions that were each engaged in delivering an educational innovation, and the psychometric properties of SITE were evaluated.

Ethics

Ethical approvals for interviews and administration of SITE were granted by the (blinded university for review) Social and Behavioural Research Ethics committee, the state Department for Education, and school principals. Written consent was provided by each interviewee. Voluntary completion of SITE was taken as consent by the respondent. Participants' names were not collected. Organisation names and locations were de-identified.

Phase 1: Theoretical perspectives of components of sustainable implementation

We conducted a data-base search (ProQuest; Scopus; PsychInfo; Medline) for instruments that measured program sustainability, using the search terms scale or measure* or guide or survey or instrument or tool AND Sustain* OR routinization OR institutionalization. Our screen of titles and abstracts, and then reading of full texts identified 17 measures or reviews of measures. Examples of measures included the Level of Institutionalization Scales (Goodman, McLeroy, Steckler, & Hoyle, 1993); the Long Term Success Tool (Lennox et al., 2017); a measure to assess factors related to sustainability of school-wide Positive Behavior Support (McIntosh et al., 2011; McIntosh, Mercer, Nese, & Ghemraoui, 2016); and the Stages of Concern questionnaire (George, Hall, & Stiegelbauer, 2006, 2013). All 17 measures are listed in Appendix A.

In addition, we conducted a data-base search (ProQuest; Scopus; PsychInfo; Medline) using the terms sustain*, embed*, and maintain*. We discovered that components of sustainability have been usefully reviewed and summarised by Wiltsey Stirman et al. (2012), Cooper et al. (2015), and Lennox, Maher and Reed (2018). The purpose of this paper is not to repeat those literature reviews, but to build upon that literature and take the next step of translating theoretical constructs into a practical application that can be used by researchers and schools.

Following the advice of Miles and Huberman (1994) our project team created a 'monster spreadsheet' that listed all of the components of sustainability that we could glean from the abovementioned data-base searches. This included the three in-depth literature reviews, plus hand-searched papers from reference lists if they suggested additional components of interest. In all, we screened over 130 papers and identified over 100 components of sustainable implementation. It is notable that most of the literature that we sourced came from the health promotion field, with substantially fewer studies about sustainable implementation appearing

in the education literature. Leadbeater, Gladstone and Sukhawathanakul (2015) and Evans, Murphy and Scourfield (2015) called for a better understanding of how *schools* plan for program sustainability. It was also noticeable that articles that adopted a complex systems perspective of sustainable implementation seemed sparse in the education literature (however, see Evans et al., 2015; Keshavarz, Nutbeam, Rowling, & Khavarpour, 2010; Mason, 2009).

As a resource for future researchers and practitioners, we have selected and thematically organised key papers from our literature search and created two documents, namely an annotated bibliography and a table of measures, that are freely available at the project web page (blinded for review).

Concurrently with the literature review, we collected interview data from organisations that were successfully sustaining curriculum initiatives.

Phase 2: Interviews

We used convenience and snowball sampling to identify 21 educational sites (schools and education providers) in [Blinded location for review] that were sustaining successful, (in their view), novel educational programs. Initiatives included, for example, an environmental program, a mental health promotion program, a mathematics teacher professional learning program, and a nature play installation.

We composed a short set of focus questions about sustainable program/initiative implementation, with the three core questions being,

- 1: What, in your opinion, were and are the factors that enable the program/initiative to be maintained/ sustained?
- 2: What were some of the main challenges in terms of continuing the program/initiative? And how did you overcome these challenges?
- 3: What advice would you give to other schools about how to go about sustaining and growing educational programs/initiatives?

Organisational leaders were asked to identify staff who were involved in implementing the selected program/initiative. Seventy staff, including school principals, coordinators, and classroom teachers were identified and agreed to be interviewed. Interviews lasted about one hour each and were audio-taped. The audio-tapes were uploaded to NVivo (v11) and thematically coded using the deductive themes identified from the literature search described above. Inductive themes also emerged. Themes were discussed by the project team, iteratively refined, and aligned to the reviewed literature where possible.

Phase 3: SITE creation

As we delved into the literature and interview transcripts it became increasingly apparent that when taken together, a large and broad range of components of sustainable implementation were identifiable. There was substantial similarity between many of the components identified from the literature and the components identified in the interviews, such as Leadership and Resourcing. However, each individual research paper (other than in meta-analyses) or participating organisation offered a relatively restricted account of the potential scope of influences. Individual research studies might highlight a few components of sustainable

implementation but tended to under-estimate the range of systemic influences on sustainability at any one location. This is to be expected given that research studies are typically focussed at the project level. However, this makes it difficult for practitioners to gain an overall view of the range of components of sustainability that need to be considered during their project planning and implementation. Similarly, during interviews, staff at different locations emphasised different aspects of their sustainability practices, but individual staff did not address a substantial proportion of components of sustainable implementation that were evident across multiple projects, and which had the potential to be influential in their own contexts.

For example, staff at only one site referred to explicitly planning at the School Governing Council level for long-term sustainable implementation, notably by documenting actions to achieve their selected program into the school five-year strategic plan. More typically, staff referred to discussions about sustainable implementation arising in response to a key limiting event, such as funding running out, change of school leader, or departure of a key driving teacher, externally funded project officer or volunteer. It was not unusual for a program to be discontinued as a result of such limiting events. Interestingly, discontinuation of a program was not necessarily seen as a serious deficit, but rather as a natural “cycle” in response to seemingly uncontrollable events and the passage of time.

Interviewees placed emphasis on their personal roles in sustainable organisational change, such as Personal Agency, and Personal Resilience. Teachers also emphasised their Adaptations to Programs, which is particularly relevant to a complex systems perspective defined by properties such as emergence, feedback, and adaptation (Rutter et al., 2017). In this view, sustainable implementation is cyclical, including planning for both short-term and longer-term implementation as well as for renewal (whilst accommodating fidelity to program goals and regulation of decay, Evans et al., 2015; Han & Weiss, 2005; Leadbeater et al., 2015). Author (2019) argued that curriculum initiatives that preclude teachers’ adaptations, but instead require strict adherence to manualised content and scripted pedagogical approaches are likely to have a short life. Such implementation designs overlook the quality of teachers’ professional knowledge in fields previously outlined by Shulman (1986, 1987), such as pedagogical content knowledge and knowledge of learners and their characteristics.

It became apparent from our discussions with staff that it would be useful to have access to a guiding framework of systemic components of sustainable implementation that could be used to inform school improvement initiatives. Some sustainability frameworks and surveys have been reported in the literature, but mostly in the health promotion field. For example, an early “Level of Institutionalisation Scale for Health Promotion Programs” was proposed by Goodman, McLeroy, Steckler and Hoyle (1993). That scale was based on a theoretical framework of four subsystems (production, maintenance, supportive, managerial) each containing routines and niche saturation. For community-based interventions, Marek and Mancini (2004) developed a seven factor Program Sustainability Index (Demonstrating desired results; Understanding the community; Flexibility; Effective collaboration; Leadership involvement; Strategic funding; Staff involvement and Integration). And for health care settings, Lennox, Doyle, Reed and Bell (2017) developed the Long-Term success Tool containing 12 sustainability factors. Specifically for school settings, Leadbeater, Gladstone and Sukhawathanakul (2015) investigated staff intentions to sustain the WITS (Walk away, Ignore, Talk it out and Seek help) program, and developed a framework containing four key areas namely (1) Within-School Influences, (2) Influences of the External Context (3) Program Characteristics and Support, and (4) Effects of Variations in

Implementation. Evans et al. (2015) undertook a formative process evaluation of a student assistance program. The authors worked within the UK Medical Research Council's framework for Developing and Evaluating Complex Interventions (phase 1), undertaking case studies in four socio-economically and academically contrasting secondary schools in Wales. Evans et al. proposed that variation in implementation could be largely attributed to four key intervention reinvention points, namely, intervention training, assessment, clarification, and responsibility.

However, the scope and detailed practical guidance of available frameworks seemed limited given our review of the literature and findings from interviews. Furthermore, as Schell et al. (2013) pointed out, sustainability is influenced by not only by programs but also by settings. Therefore, a more comprehensive framework specifically relevant to educational contexts is required. Accordingly, through discussion and iterative review we reduced the large corpus of data in the monster spreadsheet and the thematic analysis of the interviews to 20 components of sustainable site improvement, as listed in Table 1; Columns 1 and 2.

Furthermore, although the literature strongly recommends the collection and analysis of evaluation data, and the need for such data was recognised by our participants, in practice and in the literature the collection of good quality program-implementation evaluation data seemed sometimes to be an afterthought (unless a defined requirement from a funding body) and was not regularly collected. Moreover, when evaluations of program implementation are reported, the focus is typically on changes in student outcomes, or relatively short-term program maintenance within funding cycles (Author, 2017). There is a lack of data about components and processes of all phases of program implementation, indicating a need for a tool that could enable data collection about site improvement initiatives.

To address this need, we operationalised each of the theoretical components in Table 3 into a self-assessment site improvement tool (namely, SITE), with each component represented by four to six attitude questions (see examples in Column 3 of Table 1) scored on a Likert scale of 1 (Very Strongly Disagree) to 9 (Very Strongly Agree). Each thematic group also included a behavioural question (e.g. 'In the last six months I have discussed coping strategies with my colleagues').

Place Table 1: Framework for Sustainable Implementation of Effective Educational Initiatives

Phase 4: SITE administration

We delivered the SITE self-assessment site improvement tool to staff and stakeholders at nine primary schools and one external educational provider in (blinded for review). Invitations to complete SITE were delivered either during regular staff meetings or via email (according to participant availability), and in conjunction with an identified school-improvement program or initiative selected by each site. In total, 208 staff and stakeholders completed SITE. The school improvement initiatives included a whole school environmental program (e.g. kitchen garden, waste management, wetlands); whole-school wellbeing promotion mission; accreditation of a bush school; teacher professional education for literacy education; and teacher professional education for mathematics education. Two forms of SITE were delivered. The short form SITE: Start up was delivered to one school that was at the beginning of introducing their initiative.

The full version of SITE, which included reflective questions about outcomes, was delivered to 9 locations where their initiative had been in operation for longer (variable) periods of time. For the purposes of the overall analyses presented in this paper all participants' responses were de-identified and averaged.

Quantitative analyses

All quantitative analyses were conducted using SPSS v25. Responses to demographic and behavioural items were analysed for frequencies and percentages. Responses to attitudinal items corresponding to the 20 SITE components (Table 1) were analysed for means and standard deviations (SD). The 20 components (each containing four or more items) were each tested as single-component congeneric models using Principal Component Analyses (PCA). The Kaiser-Meyer-Olkin (KMO) test assessed the suitability of the data for PCA. A KMO of ≥ 0.6 indicates a good quality analysis (Tabachnick & Fidell, 2013). The Cronbach's Alpha (α) test was used to measure internal consistency of the items corresponding to each SITE component. An α value of > 0.7 indicates acceptable reliability (Field, 2006). Corrected Item-Total Correlations of < 0.3 indicate poor item correlations to the corresponding SITE component and was removed if $\alpha < 0.7$ (Pallant, 2016)

Results and Discussion

Table 2 shows the demographic information of staff who completed SITE. The largest group of respondents was Educator/Teacher, at 62.9%. Females comprised 74.3%, which is typically reflective of the proportion of male/female staff in schools in this geographical area (DECD, June 2017).

Place Table 2: Demographic characteristics of respondents to SITE

Mean scores for each component were generally positive, as shown in Figure 1. Personal Resilience generated the highest mean score. The expressions of individuals' sense of Agency and Resilience in this study highlights the interactions between staff' personal dispositions and system-level initiatives. External influences and availability of sufficient Time show relatively lower mean scores. Overall the mean scores were well above the mid-points of each scale.

Place Figure 1: Mean scores for 20 SITE components

Principal components analyses and reliability analyses, shown in Table 3, demonstrated that the 20 components conceived from the literature and interviews showed satisfactory to strong KMO's ranging from 0.644 to 0.877, and good reliabilities (Cronbach alphas) ranging from 0.785 to 0.958 (Field, 2006). Variance explained ranged from 63.608% for Commitment to the Initiative, to 86.986% for Planning.

Place Table 3: Principal Component Analyses and internal reliabilities for SITE components

Inspection of items that could be removed from SITE to achieve higher scale reliability uncovered one item in the Funding component that is typically difficult to operationalise, but nevertheless is theoretically and practically important, namely, “Our site has partnered with community agencies to increase funding opportunities”. The Corrected Item-Total Correlation for this item was < 0.3 . However, the α for the Funding component was > 0.7 (Table 3), indicating acceptable scale reliability. Therefore, a decision was made to retain this item in the SITE framework.

In addition to the attitudinal questions, SITE contains 19 behavioural indicators, with response options of Yes/Uncertain/No. Table 4 shows the proportion of respondents who selected each option. The highest ‘No’ response was for active involvement in making pedagogical decisions about how to best implement the initiative. As argued earlier in this paper, restricting teachers’ freedom to adapt curriculum to meet pedagogical and student needs might impact upon successful integration of an initiative into a school system (also see Author, 2019, Berman & McLaughlin, 1976). The next two highest ‘No’ responses were for recommending and advocating for the initiative. This suggests that almost one third of respondents were not expressing agency and commitment towards their school’s selected initiative. It is well documented in the literature that bringing all staff “on board” with school renewal initiatives is essential for success (e.g. Slee et al., 2009). This result in the current sample suggests that action is needed at the school level to better engage staff in the selection and roll-out of school-improvement initiatives. Notably, one fifth of staff indicated that they had not read planning documents related to their new initiative, along with almost as many being uncertain if they had done so. Similarly, the relatively high “Uncertain” responses (almost one quarter) for availability of staff and funding suggests the need for more sharing of information with staff about the availability of resources. The highest two “Yes” responses were for discussions with friends and colleagues about site improvements and coping strategies, thus attesting to the frequency of professional sharing of ideas. Conversely, professional discussions about managing external pressures were relatively infrequent.

Place Table 4: Percentage of Yes/Uncertain/No responses to 19 behavioural questions in SITE

Post-SITE administration

For practical purposes of supporting self-assessment at the school level, the leaders of each participating school/education organisation were provided with a comprehensive SITE report (without person names) containing only the analyses for their own location. Feedback from those educational leaders has been that SITE has alerted them to a broader range of sustainability components than they had envisaged; generated fruitful discussions by leaders and staff about necessary actions at all stages of program implementation; and is predicted to contribute to greater attention to the interactions between the introduction of a new curriculum program, components of program sustainability, and the complex and emerging nature of systemic site improvement.

Limitations

This study interviewed teachers, educators and educational leaders within the broader metropolitan area of (blinded for review). The sample size for in-depth interviews was relatively large, capturing a broad range of initiatives and perspectives. The interviews highlighted practical examples of many similar components that are discussed in the literature and that can be anticipated to influence, and be influenced by, the complex adaptive systems that exist in schools. However, the sample size for the administration of SITE was relatively small, which limits generalisability. Accordingly, caution must be observed when considering this study's quantitative findings in relation to other regions and organisations. Consistent with the complex systems perspective taken, organisational context must also be considered when interpreting the results of our study.

Our self-assessment site improvement tool (SITE) is in relatively early stages of development and has potential for replication at a range of educational institutions, leading to further refinement. It is anticipated that SITE will be a research tool and also a practical tool that can be used by schools to inform staff and leaders about components that need attention if the changes they hope for from school improvement initiatives are to eventuate. To support such further research and school improvement, we have made SITE freely available to researchers, schools and educational institutions via the project website (blinded for review).

Conclusion

This paper has described a mixed-method four-phase study involving literature review, interviews, and creation and administration of a site-improvement tool. Our aim was to draw from multiple sources of information to assist in understanding relationships between implementation of educational innovations and sustainable school improvement. Our vantage point of viewing sustainable implementation across a number of locations that were each delivering a different curriculum initiative, in conjunction with our reading of literature from implementation science and school improvement, indicates that typical project-based, step-wise approaches to implementation take a too-narrow perspective. As our participants told stories about the implementation of novel programs at their schools it confirmed the proposition that the introduction of a new curriculum initiative is not an isolated event. Rather, it is a site improvement initiative that needs careful attention to how the initiative is continuously integrated within interacting components in the complex adaptive systems that are schools.

During our review of the literature we observed that since approximately year 2000 there has been increased recognition that schools (and other organisations such as community health services) are complex adaptive systems that interact at various levels and in reciprocal ways to the introduction of innovations. As Fullan (2005) pointed out, sustainability is not an endpoint of school change. Instead, sustainability is a dynamic process of school change incorporating concepts of adaptation, capacity building, emergence, and evolution (Shelton, Cooper, & Stirman, 2018). In such a non-linear and contextualised approach a complex whole is greater than the sum of its parts (Mason, 2008, 2009; McQuillan, 2008).

In particular, teachers and school leaders are active agents in implementation. As Author (2019) has argued, we expect pre-service and in-service teacher education institutions to support teachers to become critical and reflective practitioners. It is desirable that teachers review, evaluate, select and adapt curriculum resources to suit the particular learning-needs of their students and the contextual requirements of their school. Viewing teachers as active agents at

the interface between curricula and students illustrates how top-down programs, that might show fidelity to program requirements, nevertheless might fail to sustain in authentic classroom settings. School improvement does not require acts of compliance: it requires engagement in developmental processes (Trombly, 2014). When a new program or innovation is introduced to a school, dynamic interactions between staff shape emergent behaviours that lead to system stress which in turn, triggers change (Hawe, Shiell, & Riley, 2009; McQuillan, 2008; Rosas, 2017). A well-documented example of where ‘voltage drop’ and ‘program drift’ (Chambers, Glasgow, & Stange, 2013) compromised program fidelity and clashed with the need to accommodate systemic complexity and localised program adaptation was the SEAL (Social and Emotional Aspects of Learning) initiative in the UK (e.g., see evaluations by Humphrey et al., 2010; Lendrum, Humphrey, & Wigelsworth, 2012; Lendrum, Humphrey, & Wigelsworth, 2013; Wigelsworth et al., 2012, 2013).

The shift in theoretical conceptualisation to recognise more fully that schools are complex adaptive systems requires a move away from linear cause-effect, step-wise frameworks of program implementation. Salient examples of this conceptual shift can be observed in health promoting schools initiatives. For example, The Healthy Primary School of the Future (HPSF) project (Bartelink et al., 2018), the Marathon Kids UK project (Chalkley et al., 2018), the ‘It’s Your Move!’ project (Malakellis et al., 2017) and the WHO STOPS childhood obesity project (Allender et al., 2016), explicitly address components of complex adaptive systems in their program designs.

The quality of attention to diverse interacting components of emerging system change will influence the sustainability of effective school improvement initiatives. Leading and managing the broad possible sources of system stress are critical to supporting desired system improvement, and highlight the need for supports such as the SITE tool described in this paper. The broad scope of the components of SITE recognises that each complex system will react in its own ways to innovation.

Acknowledgements

This study was supported by a research grant from (blind for review). The authors would like to acknowledge feedback on the development of SITE: Sustaining Innovation Through Education from (blind for review), as well as research assistance at various phases of data collection from (blind for review). Thanks also to the school leaders, teachers, educators and associated stakeholders who contributed their perspectives and time to this research project.

Declaration of Interest

The authors declare no conflicts of interest in the publication of this paper.

Table 1: Framework for Sustainable Implementation of Effective Educational Initiatives

Theme	Components	Sample Attitude questions
Organisational culture	Site Improvement	<i>Site leaders support ongoing improvements in how we operate</i>
	Personal dispositions	<i>I know how to approach site leaders to get them on board with new initiatives</i>
Implementation processes	Resilience	<i>My work is aligned with my personal values</i>
	Selection	<i>The initiative was selected in response to needs that had been identified at our site</i>
	Planning	<i>Goals for the initiative have been put into writing</i>
	Leading	<i>Site leaders effectively communicate the vision of the initiative</i>
	Commitment	<i>The initiative is presented to staff as a long-term commitment</i>
	Involvement	<i>Staff perspectives about how the initiative should be implemented are valued</i>
	Teams	<i>A visible team is responsible for implementing the initiative</i>
Organisational Capacity	External	<i>The initiative exists in a supportive external economic environment</i>
	Capabilities	<i>Staff have the necessary expertise to deliver the initiative</i>
	Funding	<i>Our site has accessible data about the costs of the initiative</i>
	Staffing	<i>We have enough staff to deliver the initiative</i>
	Time	<i>Sufficient time for professional education about the initiative is incorporated into site schedules</i>
Data	Implementation Data	<i>Feedback about how the initiative is being implemented is shared with staff at least once per year</i>
	Outcomes data	<i>Feedback about the outcomes of the initiative is shared with staff at least once per year</i>
Change	Adaptability	<i>Feedback about the outcomes of the initiative drives adaptations to better meet students/clients' needs</i>
	Processes	<i>Since introducing the initiative, processes for working with students/clients have shown sustained improvement</i>
	Relationships	<i>Since introducing the initiative, my professional relationships with leaders have shown sustained improvement</i>
	Site renewal	<i>As challenges emerge they are met with insightful thinking at our site</i>

Table 2: Demographic characteristics of respondents to SITE

Demographic characteristics	Frequency	Percent
Respondent role		
Educator/Teacher	66	62.9
Internal Project officer	11	10.5
Leadership/Middle Management	7	6.7
Parent/Caregiver	6	5.7
Senior Leadership/Senior Executive	6	5.7
Support Staff	6	5.7
Voluntary Worker	1	1.0
External Project Officer	1	1.0
Respondent gender		
Male	25	23.8
Female	78	74.3
Non-gender specific	1	1

Table 3: Principal Component Analyses and internal reliabilities for SITE components
 Table note:

Theme	Components	KMO*	Eigenvalue	% Variance Explained	Cronbach's alpha**
Organisational culture	Site Improvement	0.852	3.241	81.028	0.920
Personal dispositions	Agency	0.829	3.284	82.108	0.927
	Resilience	0.818	3.407	85.175	0.938
Implementation processes	Selection	0.820	3.408	85.205	0.955
	Planning	0.828	3.479	86.986	0.944
	Leading	0.841	3.388	84.694	0.943
	Commitment	0.644	2.544	63.608	0.811
	Involvement	0.726	2.709	67.720	0.841
	Teams	0.799	3.220	80.492	0.915
Organisational Capacity	External	0.666	2.805	70.116	0.846
	Capabilities	0.857	3.356	83.893	0.947
	Funding	0.680	2.615	65.386	0.785
	Staffing	0.647	2.602	65.059	0.837
	Time	0.857	3.557	88.935	0.958
Data	Implementation Data	0.854	3.214	80.349	0.930
	Outcomes data	0.828	3.329	83.237	0.947
Change	Adaptability	0.803	3.226	80.650	0.915
	Processes	0.789	3.254	81.353	0.925
	Relationships	0.838	3.336	83.388	0.936
	Site renewal	0.877	4.828	80.459	0.952

* KMO = Kaiser-Meyer-Olkin (KMO) test. KMO index of ≥ 0.6 is required for good factor analysis (Tabachnick & Fidell, 2013).

** A value of > 0.7 is considered as acceptable reliability (Field, 2006)

Table 4: Percentage of Yes/Uncertain/No responses to 19 behavioural questions in SITE

	% No	% Uncertain	% Yes
In the last six months I have discussed with friends or colleagues specific examples of where improvements have been made at my site	8.1	9.1	82.8
In the last six months, I have advocated for the introduction of a new initiative	30.2	12.5	57.3
In the last six months, I have discussed positive coping strategies with professional colleagues	8.2	9.2	82.7
In the past six months, I have openly expressed my support for the selection of this initiative	12.8	10.6	76.6
In the past six months, I have read one or more of the above planning documents	20.2	16	63.8
In the past six months, I have been supported by site leader(s) to implement the initiative	11.4	10.5	64.8
In the past six months, I have discussed with professional colleagues the external pressures that might influence the initiative	23.9	4.5	7.6
In the past six months, I have recommended this initiative to other professional colleagues	30	5.6	64.4
In the past six months, I have been actively involved in making pedagogical decisions about how best to implement the initiative	31.8	10.2	58
I have undertaken sufficient professional education to enable me to roll-out the initiative	20	11.8	68.2
In the past six months, I have had productive discussions with initiative team members about the initiative	11.3	11.3	77.4
In the past six months, I have had enough funding to implement my parts of the initiative	6.4	23.4	70.2
In the past six months, I have had access to enough staff to support my implementation of the initiative	9.4	24.5	66
In the past six months, I have found that there is sufficient time during my work with clients/students to fit in the initiative	18.6	15.3	66.1
In the past six months, I have received feedback about how the initiative is being implemented	8.1	12.9	79
In the past six months, I have looked at feedback about the outcomes of the initiative for my own students/clients	16.9	8.5	74.6
In the past six months, I have made adaptations to the initiative as a result of feedback	10.7	10.7	78.6
In the past six months, I have discussed with professional colleagues how processes at our site have improved	19	15.9	65.1
In the last six months, I have discussed with professional colleagues how professional relationships at my work have improved	20	21.7	58.3

Appendix A: Results of data-base search for measures of sustainable implementation

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