Using the Embedding Change Model

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Abstract In this chapter, we outline the process and tools that we found best facilitated the use of the Model. We present these here for you to adapt for use in your own contexts. We share the 6 steps we followed: (1) Scoping and structuring the process; (2) Considering project participants, their roles and their leadership capacities; (3) System mapping; (4) Engaging and developing the network; (5) Providing, sharing and developing new knowledge and information; and (6) Action research/reflection in/on action. As mapping the system of concern is a key process, we also share the questions we used to help participants identify their system of interest, determine its purpose, decide on the transformations being sought, and develop their own model of the component parts and boundaries of their system. We conclude the chapter by discussing a range of barriers, and our strategies for overcoming these.

Introduction

Through the many stages of our project, we have identified a number of processes that facilitated the use of our model. These have helped us to successfully enact change within our teacher education systems. This chapter provides strategies for using the Embedding Change Model to create pathways for change, and in particular highlights tools that we found useful during the project. The material presented in this chapter is designed to be flexible and adaptive. While you will choose to use the suggestions in this chapter in ways that match your particular context, our aim is ultimately to assist you to help your students develop new perspectives on EfS, and to develop skills to enable them to become effective EfS teachers in early childhood services and schools. This chapter also identifies barriers to the change process and explains some strategies that were successful in our projects for overcoming these. This chapter is largely based on the following report: Stevenson, Davis, Ferreira, and Evans (2014).

Strategies

This section provides advice on how to use the Embedding Change Model to create pathways for embedding EfS in teacher education. Some of these steps, especially Step 5: Providing, Sharing and Developing New Knowledge and Information, should be done concurrently with other actions throughout the life of the project (see Fig. 1). At the end of this section, we share examples of the processes we employed which were all framed in relation to the Embedding Change Model.

When selecting tools to further your project, keep in mind the principles of EfS to ensure that the tools you are using are well aligned with these principles. These tools might include, for example, systems thinking, collaboration, participation, critical reflection, action, contextually relevant approaches, and so on (Tilbury, 1995).
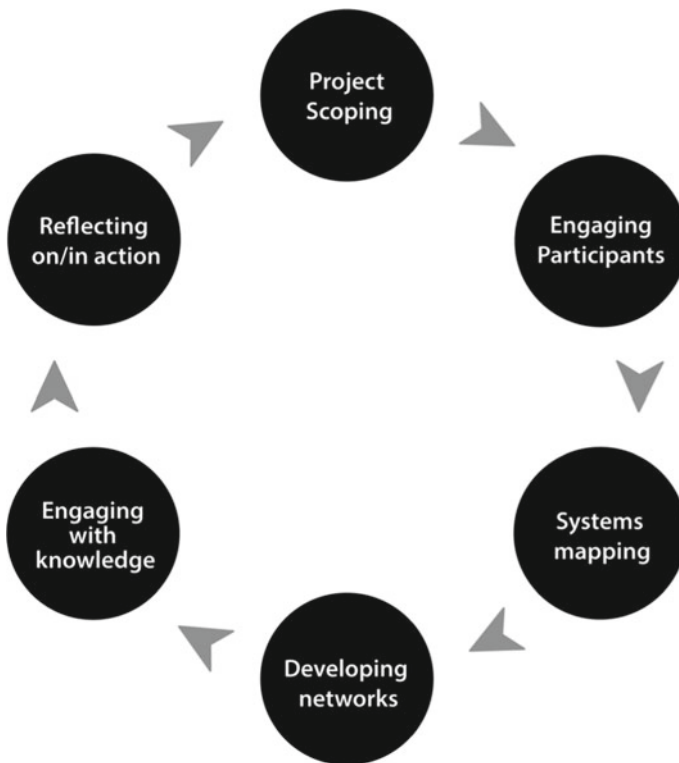

Fig. 1 Steps to change

Step 1: Scoping and Structuring the Process

Scoping your project will help you to consider and manage your timeframe, budget and resources. We suggest you begin by assembling a project team from the various sub-systems you initially identify in your teacher education system. This will allow you to move beyond individual, siloed attempts at embedding EfS and begin to establish the systems-based networks through which system-wide change will occur.

Step 2: Considering Project Participants, Their Roles, and Leadership Capacities

Leadership is an important consideration when seeking to effect system wide change. At the start, the roles and expectations of the project team and the project participants need to be clarified. We suggest you consider the kind of leadership you want for the projects, so that you are able to build both horizontal and vertical leadership into the project from the start. In thinking about leadership approaches, it is also important to ensure that these are philosophically consistent with EfS.

Step 3: System Mapping

Given the systems focus of the Embedding Change Model, it is important to explore and identify the elements of the system within which the change you wish to achieve is to occur. Systems mapping is a strategy that will help you to identify the components of a system (the sub-systems) and the relationships and interactions between them.

Systems mapping supports strategic action by helping to map out spheres of influence. For each component in a system, try to identify the individuals who are your hubs or key agents of change. Also think about how the components interact with one another and how the system interacts with its environment. In initial teacher education, for example, key agents of change could include teacher education institutions (administrative and academic staff, students), Departments of Education and the Environment, teacher registration authorities, national or State curriculum authorities, professional teacher associations, education unions, and schools.

Through the development of a systems map, you are able to explore the breadth of the teacher education system within which you are working, as well as the relationships between the system components. Understanding this allows you to see the various avenues for leveraging and facilitating change. The map can then be used as an initial discussion point with others you are seeking to engage in the change, so they can see their influence on and in the system, and expand on the roles, responsi-

bilities and relationships of their sub-systems as well. A systems map also allows all participants to see a visual representation of their place and role within the system as a whole.

Step 4: Engaging and Developing the Network

Networks are a strategy to embed and scale-up change within and across systems. They offer ways of building capacity, and creating cultural change, within large-scale organizations and systems such as teacher education institutions and schools (Ferreira & Davis, 2012). Put another way, collaboratively developing a systems map provides the structure for change, and the networks provide the relationships for change.

In implementing the systems change model, you will be creating a network that engages at multiple levels of a teacher education system. This is necessary to form the sorts of relationships that will allow for collaboration on key issues and embed change throughout a system. Networks also provide commitment and support for systems change initiatives.

These networks and relationships can be created and nurtured through one-on-one meetings, workshops and frequent online engagements (emails, Zoom/Skype, etc.).

Workshops

Workshops provide a safe, face-to-face space within which to:
- Create new relationships and networks
- Collaborate, participate and support
- Develop knowledge and understanding
- Think critically
- Reflect on processes of change.

Our projects held three workshops, of two days each, around 3 months apart. Participants gained important benefits from the workshops including building support through being part of a broader network; creating new relationships within the teacher education system; clarification of purpose and process; exposure to new knowledge and perspectives; and understanding that people are at different stages and were doing different things in their EfS journey.

Tip: Workshop minutes are valuable research data. Make sure you have ethics approval to use this data.

Online engagement

This strategy provides opportunities to:

- Use technology to overcome location and cost barriers
- Maintain contact within a network over time
- Achieve similar outcomes from workshops in a more efficient way, e.g. group discussion, develop networks.

Our projects used monthly tele-conferences to encourage participants to discuss emerging issues, understandings of EfS, constraining factors, and to reflect-on-action and systemic change processes. Participants liked the sharing nature of these meetings as they helped them to stay focused on the project, and to discuss and clarify issues as they emerged.

Tip: There are now a number of alternatives such as Zoom, Skype and UStream which will give you visual connection as well and can be audio recorded as data.

Step 5: Providing, Sharing and Developing New Knowledge and Information

As with any new project, process or model, there may be varying levels of understanding amongst participants around key concepts such as EfS, systems change and systems thinking. It is important to develop shared understandings of these concepts so that participants are able to communicate effectively on these issues and decide on appropriate actions to enable change. Sharing and developing knowledge within the network allows for the development of a system wide vision and approach to change.

We explored the various conceptions of EfS among project participants by holding small group discussions about sustainability and what it means for educators, identifying characteristics of EfS and its implications for teacher education curriculum and pedagogy, and sharing current status and approaches to EfS in teacher education institutions.

These discussions allowed group members to develop a vision of EfS that was appropriate to their institutional situation and an understanding of the implications for teacher education, and how embedding EfS into teacher education may best be achieved within their own institutions and in the system as a whole.

Under the guidance of the project team, participants were then able to start to work with their teacher education colleagues to identify and map approaches to embedding EfS in their teacher education curriculum that were consistent with the project's shared vision of EfS.

Such discussions can be facilitated by tools such as *Pecha Kucha presentations*, which invite participants to share the current status of and experiences with embedding EfS in their teacher education institutions and illustrate changes they achieve over the life of the project, in a short and focused way.

> **Pecha Kucha**
>
> This is a presentation format that allows for short, sharp presentations.
> - 20 slides × 20 s each, automatically timed = 6 min 40 s.
> - The format keeps presentations concise, and keeps things moving at a rapid pace.
>
>   We used this strategy for participants to showcase EfS in teacher education at their institutions, and to highlight the progress that had been made as a result of their systems change projects. Participants enjoyed this style of presentation and were glad to have the opportunity to share and discuss progress on their initiatives.
>
>   *Tip:* Varied interpretations of the concept of Pecha Kucha can result in interesting presentations. There are many websites with information and advice on Pecha Kucha.

Step 6: Action Research/Reflection-in/on-Action

When working to effect change within a complex system—such as the teacher education system—cause and effect can be hard to recognise and measure. Influences and actions may have unexpected results, and these often manifest in non-linear ways. Action research, with its strong reliance on reflection, provides an approach to understanding the impact of actions and interventions within a system (Kemmis & McTaggart, 2005). Critical versions of action research are conceptually consistent with EfS (Stevenson & Robottom, 2012).

Action research involves a systematic process of cycles of planning and action followed by observation and reflection. Reflection-in/on-action is a less formal and systematic process than action research. Under both approaches, participants define a problem, such as embedding EfS in teacher education, plan and undertake actions, then monitor/evaluate and reflect on observations of these actions. These opportunities for reflection allow actions to be revised—to incorporate new learning—as the project progresses. Action research or reflection-in/on-action are useful approaches when undertaking a systems-based approach to change as they provide opportunities for deep engagement, reflection and change. We used case studies to help document the action research process.

Case studies

This tool is used to report, investigate, analyse and reflect on an individual project. They can be presented in many formats. Participants were asked to prepare a case study as part of the project. Preparing a case study helped participants to capture and evaluate their initiatives for embedding EfS in teacher education. Participants reported that they found the case studies enjoyable to write, as they provided them with an opportunity for reflection, and to identify next steps and potential areas of research.

Tip: Although we referred to these documents as case studies, they were in effect a personal narrative of participants' lived experiences. They can be supplemented by workshops and online discussions about how the project is progressing, what initiatives are taking place in other institutions, and the challenges being faced along the way.

Snapshots From Our Project

Scoping the Process and the System

To initiate implementation of the systems model for embedding EfS in teacher education we assembled our project team—this consisted of teacher educators at the tertiary level from a number of institutions. We then engaged stakeholders from academic, government and professional organizations.

Workshop 1: Introduction of EfS concepts, systems mapping and status of EfS in teacher education, developing networks. The systems mapping exercise was carried out using a template which provided trigger questions to engage participants to consider key elements within the system. These system maps took shape in the form of drawings, mind maps and PowerPoint slides.

Questions for systems mapping exercise	
Identity • What is the identity of your teacher education system (the inner circle)? • What distinguishes it? • How would you recognize it? • If you were to name it, what would you call it? • What is the identity of the wider system (the environment) in which your system is located?	**Purpose** • What is the purpose of your system? • What is the purpose of the wider system/environment in which your system is located?
Transformation • What do you want to change? Work from the present to the desired situation. Why is this issue/change important? What is your interest in the issue? • Who has the power and/or influence to allow/enable this change? • Who are the people involved in the change? Consider those who will benefit and those who will not • Who is going to do the work to make the transformation happen? • Who will be the guardian or custodian of the transformation process? This is someone who is independent/has no power but who can give voice to the consequences of your actions that you may not see • What are the environmental factors that affect the system? That is, what will expand or restrict the process of transformation—think about resources, social norms, institutions, policies, regulations and legislation, technology, communications, research, individuals, etc. • What are the sub-systems? Describe the purpose and function of each sub-system: what does it do, how does it make an important contribution to the larger system? Next think about the all-important relationships between the sub-systems, as these are more important than the sub-systems themselves when seeking to transform a system	**Modelling** • Develop a model of your system • Think deeply about the relationships and interactions between the sub-systems. Develop a 'demand' model by asking what each sub-system needs of every other sub-system. Think also about resources, information, products, power, influence, and communications within and between your sub-systems. Do this for each of the relationships between each of the sub-systems

Participant Roles and Leadership

We explored the theories of leadership with participants and examined how they aligned with principles of EfS. Participants found these discussions helped to clarify their roles in the project and their roles within their own teacher education institutions. Most importantly, it helped participants to see themselves as leaders of change in their institutions.

> Workshop 2: Focus on leadership, processes for enabling change, Pecha Kucha presentations from participants about current status of EfS in their teacher education institution, opportunities for research from the project.

Engaging and Developing the Network

The project team engaged representatives from teacher education institutions, Faculties/Schools of Education and relevant professional bodies across Australia in a multi-level systems-based approach, involving collaboration at the State, institutional and program levels, to develop curriculum practices that reflected a shared vision of EfS.

The project commenced in Queensland and first identified and engaged key participants at the Faculty level. Together these participants developed of a vision of EfS in teacher education for the project as a whole and worked to identify what was meant by the Queensland teacher education system, including its sub-systems and the relationships between all parts of the system. The network was then expanded to include all other sub-systems, including teacher registration authorities, government agencies and professional associations. Near the conclusion of the project, a national network that included representatives from a teacher education institution in every other State and Territory in Australia was established to ensure strong state-based teacher education networks, all working to embed education for sustainability.

> Workshop 3: Pecha Kucha presentations were delivered by participants about the new status and progress of EfS in their teacher education institution as a result of project initiatives. Participants also reflected on the ways in which the model for change and involvement in the project had facilitated this change and discussed next steps.

Barriers and Opportunities

The Embedding Change Model is not designed to uphold the status quo, but to create change within a system. Consequently, there are likely to be barriers to implementing change using the Model. Listed below are some of the common hurdles to embedding EfS in teacher education that emerged in our projects. While these barriers to change may at times seem overwhelming, we list below a number of strategies for overcoming them.

Barrier 1: Engaging the System

Barrier: Research indicates individual teacher educators are motivated to change and have the ability to incorporate EfS (Steele, 2010). The greatest constraint is providing overall systemic support for such changes to happen.

Pathway to change: A systems approach to change provides opportunity to ensure systemic support for embedding EfS. Individual educators can employ systems thinking and tools to engage the system.

Example: Involvement in a state-wide system has given the activities of individuals involved in the project status, legitimacy and a high profile within their institutions. It has also allowed them to connect with staff in, for example, schools or government agencies in ways they were not able to before. We also found that when there is support from other areas of the teacher education system, such as State or Federal Government agencies, other parts of the system feel supported and there is less resistance to change.

Barrier 2: Crowded Curriculum

Barrier: Teacher educators often feel that there is no space for more material within their curriculum.

Pathway to change: Embedding EfS in teacher education does not necessarily mean adding significant new content; often it is a matter of modifying existing content. Start with an audit to see what is already relevant, and what can be built upon.

Example: At one of the participating institutions a curriculum refresh was underway at the time stakeholders were investigating embedding EfS into the teacher education programs. What was intended to be a minor revision to programs became an unforeseen opportunity to make links between Faculties, leading to a major restructuring of courses.

Barrier 3: Systemic Structures

Barrier: The siloed nature of organisations responsible for policy and curriculum direction provides a challenge to integrated, interdisciplinary change.

Pathway to change: Shifting the view from 'silo' to 'system' allows for links to be made between disciplines, faculties and institutions. Use these links to create support and increase the spread and efficiency of EfS initiatives.

Example: Involvement in the EfS project has enabled the sustainability voice to be heard within partner institutions. The project has provided participants with the confidence and support to offer suggestions to program developers about where sustainability can be included.

Barrier 4: Economics/Financial Support for Change

Barrier: Lack of resources or additional funds.

Pathway to change: See what existing resources can be reoriented; seek opportunities to apply for grants internally and externally.

Example: For some institutions the project was able to be piggybacked to a curriculum refresh initiative, hence the project was supported and given prominence through the refresh process. In this way, more people were engaged in talking about EfS than might otherwise have been.

Barrier 5: Volatility of Higher Education Sector

Barrier: The higher education sector is undergoing significant change, including restructuring in many institutions. There is uncertainty around the outcomes of such restructures.

Pathway to change: The higher education sector is changing all the time. However, this dynamic atmosphere presents opportunities for deeper and wider change as existing systems, structures and processes are dismantled.

Example: While we couldn't see changes at the start of the project, they ended up coming about very quickly—hard and fast—given the multiple disruptions being experienced in the higher education sector, including the need to be more responsive to contemporary educational issues and needs, and for education to be relevant to learners in the 21st century.

Barrier 6: Limited Awareness or Expertise in Staff and/or Institution

Barrier: Individuals' understandings of EfS are often limited if they are viewed solely through the lens of individual disciplines. For example, a science educator may not see the relevance of discussing the social justice or economic dimensions of EfS, making it difficult for those seeking to enact change to convince others of their role in that change.

Pathway to change: It is not necessary to be an expert to begin to explore possibilities for EfS in teacher education. Professional development, connecting with EfS networks and with experienced colleagues can help establish new knowledge and understanding of EfS.

Example: Through knowledge gained and connections made in this project, links have been made between professional experience and EE centres. For example, as a result of our initiative, more students in Queensland were able to undertake their professional experience placement in EE centres, extending the teacher education experience of EfS beyond the tertiary setting and out into the system.

Barrier 7: Limited Institutional Commitment

Barrier: Disconnect between different levels. For example, there may be Vice-Chancellors who endorse sustainability at an institutional level, which may not align with the priorities of those who are concerned with managing budgets.

Pathway to change: While there may not be explicit mandates for EfS in your institution, there are often EfS dimensions that can be explored within existing teacher education agendas. Find these openings to build alliances, interest and commitment. Develop a business case for EfS in your faculty.

Example: This project and process has provided a voice for EfS at universities involved in our initiative. It has created awareness and as a result, opportunities have arisen at different levels, including new accountability in work units around sustainability measures and new opportunities for research on sustainability in universities.

Ideas for the Future

Below are some initiatives implemented by our project participants. We hope these provide some ideas for you to use in your efforts to embed EfS in teacher education at your institution.

Map current EfS practices and needs within at least one teacher education course/program at your university	Extend the repertoire of curriculum and resources for embedding sustainability in teacher education and major disciplinary areas
Improve pedagogy through creating communities of EfS practice across Schools of Education and select disciplinary areas	Develop and implement activities to enhance participation and engagement of academic staff across Schools of Education and disciplinary specializations
Use tools such as case studies to gather data for research on embedding EfS in teacher education.	Apply action research principles to your network communications and initiatives to create opportunities for learning, reflecting, and revising
Use your approaches to and projects for embedding EfS in teacher education as opportunities for your own research	Capitalize on the networks that have been created within the system to generate future projects and additional changes
Contribute to the development of a vision of EfS in teacher education for your university	Create a local sustainability network at your education faculty level. Use this as a platform to map the teacher education system and expand your network

Chapter Summary

In this chapter we have presented a 'how to' guide for utilizing our model in system-wide change. Key to implementation are the mapping of one's system, the identification of key agents of change who act as hubs within the system, and the development of a shared vision and networks. With these in place, change is more readily facilitated within sub-systems and across a whole system.

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