Chapter 3

Innovation in Education and Vocational Education and Training

This chapter presents a literature review of innovation in education and vocational education and training. Innovation is a term more often used than clearly defined in education, often employed interchangeably with related terms such as invention, reform, and change. New ideas, knowledge, and practices, however, can fail if they do not bring their desired results, impact negatively on other objectives, create new problems, or are not cost-effective. Although an assessment of whether to implement an innovation requires looking at its implications for other parts of its environment beyond those immediately affected, such kinds of systemic analysis are infrequent. There is a wide range of stakeholders in the process of innovation in VET, whose commitment and collaboration is crucial to success and who have different incentives for the inception and adoption of innovation. Available evidence suggests that VET organisations are not making use of the whole range of facilitators of innovation available to them and consequently, there is much unlocked potential in the VET sector to facilitate and increase innovation. Educators and policy-makers, on the other hand, have not sufficiently used the motors of innovation, including research in education. Research on teaching and learning from cognitive science, neuroscience, organizational theory, and other disciplines has thus rarely been put into practice. Furthermore, adequate research capacity has been lacking even in relatively general areas. The chapter closes with a model of innovation in education developed by the OECD Secretariat for this study, that is utilised in the analysis of the case studies in the empirical chapters of this publication.

Introduction

This chapter presents a literature review of innovation in education and vocational education and training. The chapter is organised as follows: it first deals with the definition of innovation, its types and measurement; second, it reviews stakeholders involved in – and processes leading to – innovation; third, it analyses the relationship between educational research and innovation. The final part of the chapter provides a model of innovation in education, developed by the OECD Secretariat for this study, that serves as a background to the analysis of the case studies in the empirical chapters of this publication and the subsequent path towards the development of a typology of innovations in VET in Chapter 7 and a set of policy lessons. The reader is invited to note that while the chapter focuses on innovation in VET, substantive references are made to innovation in education more generally. There are two reasons for such references. First, there is greater coverage in the literature of innovation processes in education than in VET; this is precisely a gap that subsequent chapters of the present report try to address. Second, in spite of the specificity of VET, some commonalities with education exist in terms of innovation processes. Thus, several of the models reviewed have been proposed as generic models applicable to both education and VET – as well as, occasionally, to other areas.

Innovation in education and VET: definition, typologies and measurement

Definition

Most literature on innovation in education and VET defines innovation as the implementation not only of new ideas, knowledge, and practices but also of improved ideas, knowledge, and practices (Mitchell, 2003; Kostoff, 2003). In this respect, innovation could be differentiated from reform or change (see also King and Anderson, 2002), as these terms do not necessarily imply the application of something new to the social setting of reference, nor do they imply that the change relates to the application of improved ideas or knowledge. The most obvious problem with the incorporation of this additional attribute to the concept is that, in practice, it is difficult to know whether something is an improvement over the existing situation. Sometimes this judgment can be made only in the long term, and often it is not known at all because there is a significant lack of evidence and systematic assessment of what changes improve the previous situation.

Thus, part of the literature refers to innovation as a synonym of "novelty", *i.e.* ideas or knowledge that had not been implemented before in a given context, without incorporating the need for the concept to refer to an

improvement. Under this definition it would be possible to talk about "unsuccessful innovations" (Fullan, 1982; Carless, 1997; Kinser, 2005; *cf.* below in this chapter), which can occur, for instance, when education/training institutions are already achieving their maximum possible effect, for this situation mitigates any difference expected from new practices; when innovative ideas and technologies tried are inadequate or underdeveloped; or when innovative practices have not been properly implemented (see Berman and McLaughlin, 1974). More generally, innovations can be successful relative to their objectives but detrimental to other objectives, or they might simply create new problems (Blumenfeld *et al*., 2000). For instance, innovations can cause enormous disruption in classroom/training centres' practices. They can also be considered unsuccessful if their costs (monetary as well as those related to required training, etc.) exceed their benefits. Yet, the literature reviewed emphasises successful more than unsuccessful innovations. Most problems referred to in the literature regarding innovation are related to low take-up or low usage of valuable innovations.

The extent to which something is new to a given social context is crucial to identifying innovation. But how does one define "new"? Fuller (1981) studies innovations in various industries and argues that when half of the industries in an area have adopted an innovation, it stops being an innovation and enters a new phase: accepted practice. Malian and Nevin (2005) apply this definition to education, looking at practices in teacher education establishments, and report that there are many examples of innovation in teacher education that are increasingly being applied but are yet to achieve the 50% market penetration standard: professional development schools, teaching with educational technology, use of self-study, inquiry-as-stance, service-learning, socio-cultural pedagogical approaches. The contextual dimension of innovation is also prominent in VET, perhaps even more explicitly acknowledged than in the case of education. Indeed, some authors have argued, referring to VET, that "it is difficult for an innovation in training to demonstrate anything intrinsically 'new': its newness cannot be understood out of context" (CEDEFOP, 2005).

Types of innovation

Innovations could be classified in relation to different dimensions. Most classifications have been developed outside educational research and then applied to education. Below we describe different classifications of innovations according to the:

- Level of the innovation;
- Impact produced;
- Area in which the innovation is applied.

Which classification to use for a given study depends naturally on its focus and purpose. The classifications outlined are, moreover, not mutually exclusive.

Level of innovation

At the level of change associated with an innovation, these can be classified as radical, incremental, and systemic.

- **Incremental innovation** is associated with minor changes to existing services or processes.
- **Radical innovation** would be associated with the introduction of new services or ways of "doing things" in relation to process or service delivery.
- **Systemic innovation** is associated with new workforce structures, organizational types, and inter-organisational relationships, aiming to improve the overall performance of a system.

Most of the papers reviewed described innovations in education and training as incremental. Presseisen (1985) analyzed eight major projects, created to address widely recognised (American) educational problems, and concluded that none of them proposed any serious innovation, only adjustments to the current way of doing things (see also Cuban, 1999 for higher education [HE] institutions, Mead, 2007 for primary education, and Sellin, 2002 for VET). More generally, Mulgan and Albury (2003) argue that the majority of innovations in the public sector are incremental in nature, contributing small but continuous improvements in services.

This view is contrasted by Johnson (1984), who analyses HE faculty receptivity to innovation and concludes that HE teaching staff is less resistant to change than is often assumed in the innovation literature. The widespread "resistance to change" view is, according to Johnson, scarcely supported by evidence and often held as a self-evident truth. This view is also reinforced by reporting biases, for the innovation literature is produced mostly by the designers of innovation and excludes the perspective of those who implement it: the teachers (see also Russel and Schneiderheinzer, 2005; Berman and McLaughlin, 1974). Consequently, behaviour that does not affirm a particular innovation may be labelled "non-innovative" and regarded as problematic, whereas the difficulties may actually lie either in the innovation itself or in other factors, such as characteristics of the academic organization (Johnson, 1984, pp. 496-97). Johnson points to complex and varying patterns of faculty receptivity to change rather than straightforward resistance to change. Kirkup and Kirkwood (2005) reach a similar conclusion looking specifically at the case of the introduction of ICTs. Teachers welcome innovative uses

of technology, even if mainly to support and improve their existing activities (see also Erlt and Kremer, 2006, for innovations in VET in England and Germany). Kirkup and Kirkwood highlight a bias similar to that pointed out by Johnson when they argue that it is a mistake to extrapolate from the actions and enthusiasm of earlier adopted innovations to predict the use and impact of an innovation on the larger scale. They point to much of the recent literature on ICT in education, which has tended not to report on the behaviour of late adopters and resisters.

The *systemic change paradigm* in education was pioneered by Banathy (1968, 1991) and popularised by Reigeluth (Reigeluth *et al.*, 1993, Reigeluth and Garfinkle, 1994). Its main aim is to understand the nested interdependencies among system components that allow the system to function as more than the sum of its parts or leave it unable to function at all. While an emphasis on the whole of the system is crucial, Goertz *et al.* (1995) reported that the effectiveness of tools for building systemic capacity seems to be dependent on the degree to which they are explicitly designed and used to foster learning among individuals and organizations within the system. Reigeluth and Garfinkle (1994) edited a volume in which contributors focus on different aspects of systemic reform but share several underpinnings of the term (Ellsworth, 2000). Systemic innovation depends, according to these underpinnings, on:

- **Ensuring stakeholder involvement** (ensuring that everyone affected provides inputs and can participate)
  - Co-ordinate efforts (as opposed to people pulling in different directions)
  - Work as a team (avoiding confrontations)
- **Designing for the ideal** (challenging old assumptions)
  - Re-examine obstacles (do old barriers still exist?)
  - Research solutions (have new tools or techniques become available?)
- **Understanding interrelationships** (planning for systemic system effects)
  - Be alert for dissonance between new and existing subsystems
  - Maximise synergies (seek ways for new and existing sub-systems to reinforce one another)

- **(Re)-creating a viable system**
  - Remove barriers (that might inhibit continuous adaptation to the changing environment)
  - Re-engineer the organization (to support the new set of processes)

In VET, Ertl and Kremer (2006) point out that teachers tend to focus on subject-specific innovations rather than innovations regarding teaching and learning approaches, which could affect the system more broadly. "Systemic reform" and "scalability" are critical in this context. Systemic reform implies scalable innovation, although a scalable innovation may not be systemic, unless it explicitly addresses issues of co-ordination within the school or VET system. Such issues might include co-ordinating the development and adoption of curriculum materials with assessment requirements, insuring that teacher professional development is provided to help enact the curriculum materials, and creating teacher and administrator leadership capacity so that schools are able to make local decisions commensurate with the reform agenda. Systemic reform ultimately must be part of any scaling effort if it is to have long-lasting and wide-spread impact (Fishman, 2000). A systemic analysis should also be recommendable when considering the adoption of any innovation. Focusing on the limited effects of some innovations and the lack of adoption of certain ideas and technologies, the work of Carr-Chellman (*e.g.* Carr-Chellman and Reigeluth, 2001) links these minimal effects to the lack of consideration given to the larger system and the concomitant lack of engagement of stakeholders (see also Carr Chellman and Savoy, 2004). As Carless (1997) explains, the difficulties of introducing large-scale systematic curriculum change should not be underestimated. Problems including resistance to change, lack of adequate resources, and insufficient time for teaching training, can be expected.

Reports on an extensive use of piloting are seen to a much greater (and structured) extent in VET (*e.g.* within the Leonardo programme and other EU-funded programmes, particularly in Eastern Europe) than in education. The lessons learnt from these pilots, however, often find it difficult to make their way into mainstream practice and to generate systemic innovation both in VET and in education. While the ETF (2006, p. 23) reports a strong gap between the piloting approach and systemic transformation, it also acknowledges that increased awareness of pilot projects can go some length in changing practice (see also McNaught *et al.*, 1999). As Chrisman and Crandall (2007) note, progress in adopting, expanding, and refining innovation has been made difficult by a shortage of essential information (see also Gill *et al.*, 2000) for similar conclusions in different national contexts). Saint (2006) suggests the following dissemination strategies to stimulate changes within the education system from pilot innovation funds:

- A national innovation exhibit
- A workshop on a particular innovation of common interest
- Institutional prizes for innovation
- Periodic press coverage of promising ideas
- An education providers' (he provides the example of the university system, but this could equally be applied to secondary VET, etc.) innovations newsletter
- An institutional innovation fair

Some limits regarding the potential of dissemination and awareness, moreover, apply. Although European programmes, which are key funders of innovation in VET, aim to disseminate good practices, they do not always feed well into national systems, whereas European institutions do not have the competences to influence large numbers of other European institutions on their own. Similarly, ECOTEC (2008) highlights that often the organisations piloting innovations do not have a clear understanding of how to sustain or mainstream the effects of their pilot projects. According to ECOTEC, external evaluations of larger projects would improve the "credibility" of those projects' outputs, results, and impacts and improve the scope for mainstreaming their achievements.

Impact produced

Christense and Lærgreid (2001) look at the impact of innovations and differentiate between:

- *Sustaining innovations*: introduce improved performance to existing services, systems, or products along an established trajectory; and
- *Disruptive innovations*: define a new performance trajectory by introducing new dimensions of performance, either creating new markets or offering more convenience or lower prices to customers at the lower end of an existing market.

This terminology has been used in the area of education by Szabo and Sobon (2003), who defined instructional communication technology, and previously distance education, as disruptive innovations.

Current innovation trends: key areas in which innovations in education are occurring

The works reviewed for the production of this report have described innovation most often within certain areas, which can be employed to classify innovations. Following each area are examples of current and recent trends in innovation:

- *Access*: Recognition of prior learning, increase in opportunities for adult learning through flexible provision, etc.
- *Teaching and learning*: Unit design to enhance active learning (Ghail, 1992), use of new technologies for learning in the classroom and outside the classroom, increase use of constructivist approaches and student-centred approaches, focus on learning outcomes, etc.
- *Assessment*: Increased use of peer-assessment, focus on competences rather than knowledge alone, etc.
- *Organisational*: Mergers, increased international partnerships – including curriculum development and certification – specialisation, creation of particular types of institutions in a context where they did not exist (*e.g.* Fachhochschulen in Austria in the 1990s; European Institute of Technology), organization of the system of qualifications through the introduction of national qualification frameworks, etc.
- *Financing*: Tax-exempt or tax-deferred fee saving programmes, pre-paid tuition programmes, broad-based merit scholarship programmes, individual learning accounts, performance funding, increased diversification of income sources, etc.
- *Management*: Devolution of powers to educational institutions; increased accountability)
- *Services*: Often through the use of IT for enrolment, assessment, library changes, personalised services, etc.

Innovations in some of these areas have obvious implications in other areas. Moreover, the outlined innovations may be occurring at systemic and/or organizational level. The relationship between both levels is, in any case, strong. Widespread organizational innovations can feed into systemic innovations and systemic innovations can have obvious direct effects at the organizational level (see also the discussion on the role of different stakeholders in the innovation stages provided below in this chapter, as well as in Chapter 5 on the process and dynamics of innovation). Some of the outlined innovations, however, are chiefly being adopted at the systemic level and initiated by public authorities. This is the case with management innovations in terms of devolution of powers to institutions, increasing accountability (*e.g.* setting

up Quality Assurance and other monitoring agencies, as has been the case in many European countries in recent years), the overall framework for financing (*e.g.* diversifying revenues for education and training institutions), delivery (*e.g.* creating new types of institutions) and accreditation (*e.g.* introducing national qualifications frameworks). However, innovations in teaching and learning and assessment tend to be adopted at the organization/classroom level.

The European Commission has devoted substantial efforts and resources to the stimulation of innovation, channelled mainly through different phases of its LEONARDO programme, the European Social Fund (European Commission, 2004), and previously the ADAPT programme (Janssen, 2002). The LEONARDO programme is well resourced and had a budget of about EUR 1.4 million for the period 2000-06, of which roughly one third was allocated to Pilot Projects to develop and transfer innovation in VET (ECOTEC, 2008). In the 2008-10 general call for proposals, the programme highlighted as priority areas for innovation (European Commission, 2007):

- Developing the skills and competences of **VET teachers, trainers and tutors**
- Developing the **quality and attractiveness** of VET systems and practices
- **Transparency and recognition** of competences and qualifications
- Skills development of **adults** in the labour market
- Raising competence levels of **groups at risk**
- Developing the **learning environment** (notably through the use of ICT)

Other areas in which innovation in VET is currently sought include the integration between initial and continuing VET (see also Stasz and Bodilly, 2004), financing (*e.g.* tax rebates, state re-funding of taxes, bipartite and tripartite funding arrangements, etc.), modularization, the use of training packages (Simons *et al.*, 2003), the inclusion of industry standards in courses and assessments (Stasz and Bodilly, 2004), and the creation of stronger partnerships among stakeholders, particularly between training providers and employers (see for instance ETF, 2006; McCoshan and Souto-Otero, 2003, Mitchell, 1998; Munch, 1996).

Measurement

The measurement of innovation in education and VET, as well as in such areas as the economy at large is in its infancy (US Advisory Committee on Measuring Innovation, 2008). Maliand and Nevi (2005) note that their

review of the table of contents of the *Teacher Education Quarterly* from 1990 found no articles with titles indicating an emphasis on assessing innovation. Consequently, they conclude that "the assessment of innovation appears to be a novel, or can it be said, an innovative notion". (Maliand and Nevi, 2005)

Some indications could be made here, however, regarding the measurement of innovation in education at both the organizational and the education system levels. In this respect, it is useful to differentiate indicators on different dimensions. A common approach is to differentiate among input (which would capture the structural conditions required for innovation), output, and impact indicators of innovation (for a discussion on throughputs in innovation processes in education see below in this chapter).

Innovation **inputs** could be measured through indicators related to investment levels on innovation projects, such as the volume of funds allocated (at the organizational, national or international level) to innovative education/training pilot projects, for example. Some national institutions devote significant amounts to innovation projects, such as the US Fund for the Improvement of Postsecondary Education (FIPSE). The same is true for international institutions, such as the EU and the World Bank (see Saint, 2006). However, data gaps are important; data on national and international investment in education is extremely scarce, and data on institutional and sub-national investment in innovation is largely non-existent. Other input indicators for innovation in education have been related to ICT (*e.g.* proportion of computers for student and staff and type of access to the internet) and its use (as argued by Berman and McLaughlin (1974), the adoption/use of a technology may not be considered an innovation unless it produces an associated change in a pattern of behaviour). Another input indicator increasingly present is the time allocated to the development of innovative activities, provided that double-counting of investment in the form of funds is avoided, as this can be used by staff to "purchase" innovation time or infrastructure.

In terms of **outputs,** it is questionable whether educational innovation could be subject to independent measurement beyond a "head-count" approach. Indeed, at the organizational level, developments could be classified as innovative or not – according to a set of properties as outlined above in this chapter – and their effectiveness and/or efficiency (not only in terms of students' outcomes but also in terms of capacity created and other aspects (Blumenfeld, *et al.*, 2000) could then be measured. This would mostly deflect the measurement of innovation to general measurements of the effectiveness of different initiatives. There would not be a specific measurement of innovation in this context. A specific approach to measuring "outputs" would involve counting innovative initiatives adopted by an organization in given context of reference and benchmarking with peers. Thus, an attempt could be made to measure, for instance, students' improvements resulting from

teaching and learning innovations. By aggregating the count of innovations in individual educational organisations, a calculation of the rate of innovation at the system level – probably with reference to a set of defined areas, such as teaching and learning, assessment, or others – could be achieved. "System-wide" initiatives, such as legislation and regulations, can be subject to "headcount" output measurement too.

To measure the **impact** of innovations, two main approaches can be adopted. One would be more descriptive, comparing the performance of innovative and non-innovative education and training institutions or initiatives (or the same institution before and after the innovation) along some predefined parameters. This approach is the most commonly used in education and training and has been employed in Driel (1997), Gibbs (2001), Bodilly *et al.*, (2004), and ECOTEC (2008). The second would be an econometric approach that tries to explain performance (*e.g.* in terms of students' outputs) using a range of variables, including some that reflect innovation (see Guellec and Pattinsson, 2006 for a fuller discussion). Some authors, however, question the validity of impact measurements in relation to innovations, which may reveal their impacts only after some time (*e.g.* innovations ahead of their time may require extensive investment in infrastructure and seemingly low-impact innovations may lead to further innovations that will eventually yield great returns (see Dubner, 2008)). A practical example of impact indicators regarding the use of innovations funds is provided by Saint (2006), who outlines the following broad impact indicators for World Bank projects:

- Whether the **government** decide to **retain the innovation fund** as a mechanism for allocating its own resources when the World Bank-funded project is finished;
- **Number** of strategically selected academic **programs** updated and strengthened;
- Measurable increase in **pass rates** within targeted academic programs;
- Measurable increase in student **grade point** averages;
- Institutionalization of innovation fund within **national** higher education **budget**;
- Average waiting time of graduates for first **employment**;
- Average duration of study **time** needed to attain **graduation**;
- **Curriculum changes** in selected faculties that show evidence of increased use of new materials, updated content, different pedagogical methods, and incorporation of information technology.

Other indicators, Saint clarifies, could be linked to the specific national and institutional priorities. Still others will be determined by the unique characteristics of the individual innovations. As seen, those indicators measure the impact of the World Bank funds mechanisms specifically (indicators 1, 2, 5, 8) and the impact of the innovation itself in terms of different levels of student achievement (indicators 3, 4, 6, 7). The measurement of the impact of the innovation is in line with the previous discussion, although it also presents impacts on easily quantifiable aspects and does not cover process and capacity building aspects to any extent. Other dimensions that have been measured regarding innovation in areas other than education include goals and rates of co-operation for innovation.

Stakeholders and processes in the creation and diffusion of innovation

Introduction

This section provides information, first, on the main stakeholders, incentives to innovate, main policies, and barriers in innovation as they pertain to VET. Second, it covers the link between research and innovation in VET.

Main stakeholders, incentives to innovate, main policies and barriers

A snapshot of the main stakeholders in VET is provided in Table 3.1. Whereas several types of stakeholders overlap with those in education, a wider set of actors are involved in innovation in VET. In particular, the roles of individual employers and social partners are stronger in this area. Similarly, international organisations have stimulated innovations more directly in VET than in general education, as already highlighted.

Some of these stakeholders have long worked in innovation in education, whereas others are relative newcomers. They also have different "market shares" in the education market. This share may not be directly related to the contributions different stakeholders provide in terms of innovation. Accordingly, Hess and Finn (2007) argue that for-profit and not-for-profit private entities can be real "human capital innovators" in spite of their relatively low market share in education and VET. Some of the stakeholders presented in Table 3.1. have a bias towards innovation, but not monolithically. Thus, whereas some private companies (particularly ICT companies) have a great incentive for innovation to emerge in education, others, such as traditional publishing houses, may have strong incentives to preserve the *status quo* (Christensen and Horn, 2008). Osborne and Gaebler (1992) have noted that change in the public arena is often interpreted as a positive sign of the health

Table 3.1. **Main stakeholders in innovation in VET and selected incentives to promote innovation**

Stakeholder	Incentives to innovate/promote innovation
Teachers/Trainers	Professional development Increased effectiveness in teaching and learning
Schools/Training Organisations	Availability of innovation funding
Students/Trainees/Employees	Increased effectiveness of teaching and learning
Social Partners	Greater levels of competence of the workforce
Private Companies and For-Profit Private Companies	Creation of new markets (e.g. ICT companies) Delivery of VET Greater levels of workforce competence
Non-for-Profit Organisations and Charitable Foundations	Identification of best practices to improve the system Delivery of VET
Public Innovation Agencies	Identification of best practices to improve the system Increased role in policy making
Government (including state and sub-state agencies)	Positive public perception of change Increased effectiveness in VET policy
International Organisations	Identification of best practices to improve the system Increased role in policy making

Source: Manuel Souto-Otero (2008).

of governmental institutions – innovation reflects policy makers' responsiveness to new ideas and changing environmental conditions – and can have implications for electorate behaviour and for how they see innovation (Berry and Berry, 1992). Just as politicians may have some incentives to innovate, innovation can also make legislation complicated to adapt and can uncomfortably redefine well-established practices, such as the use of one-size-fits-all textbooks or established pedagogical paradigms (Christensen and Horn, 2008).

Within the existing range of stakeholders, teachers – and their buy-in – are singled out in the literature as being paramount for successful implementation of innovations (Fullan, 1982; Fullan and Hargreaves, 1992; Havelock, 1982; Bodilly *et al.*, 2004). Russell and Schneiderheinze (2005) report that aspects influencing the effectiveness of implementing an innovation (a constructivist-based learning environment) included teachers' abilities to benefit from it (*e.g.* through online collaborative professional development forums), teachers' problem-solving strategies, their prior conceptions about teaching and learning, and their compatibilities with the changes of instructional pedagogy. Fullan (1982) even goes on to argue that ignoring teachers' experiences is the principle reason for unsuccessful innovation: neglecting to understand

of how people actually experience change – as distinct from how it was intended – is, according to some authors, at the heart of the spectacular lack of success of most social reforms (Fullan, 1982; Cheung ,1999). As Grootings and Nielsen (2005) argue, implementing innovation no longer requires only establishing broad ownership and acceptance by teachers; if that were the case, more traditional methods of securing compliance (centralised, authoritarian, political, and administrative) with innovations could be applied. Yet, purely centralised initiatives have regularly failed because teacher accept the innovations but do not implement them (Carless, 1997). Instead, the operational detailing of innovations by teachers (even within centralised systems of governance) is crucial and must be fed in to policy makers; this is in opposition to establishing a unidirectional top-down relationship (see also Atkin,1998; Blumenfled *et al.*, 2000).

A marked trend in VET is that new partnerships are emerging among the stakeholders presented in Table 3.1 as a result of the search for innovative approaches to renew training systems (Mitchell and Young, 2001). These partnerships are redefining the roles of the state and of private partners in VET, with enterprises acquiring a significant role in improving the relevance, effectiveness, and efficiency of training systems by adapting them more closely to the requirements of markets and improving the quality of training. The inherent characteristics of business – namely that it is market-driven and flexible, and therefore rapidly adaptable to change, as well as entrepreneurial and innovative – are precisely the qualities that are often lacking in public training systems and government bureaucracies (Mitchell and Young, 2001).

One of the key lessons for countries seeking to cope with high levels of labour market uncertainty, however, is that VET should not be overly responsive to short-term labour market needs. It should instead provide broad qualifications that offer a basis for further specialisation and future development (Faudel and Grootings, 2006). The state can thus contribute to enterprise effectiveness by creating a supportive environment and promoting the adoption of a broader and longer-term perspective for training policy and systems, as well as by balancing considerations of efficiency and equity. Therefore, current efforts to form partnerships seek the advantage of using the strengths of both partners for their mutual benefit (Mitchell and Young , 2001).

New relationships are also emerging between VET organisations and their teachers, managers, and supervisors in businesses, and with members of local communities. These new relationships are leading to major innovations in training delivery, the involvement of industry as partners, and greater levels of customisation of training. As Mitchell (2003) notes in his report on innovation in teaching and learning in VET, such change is requiring new and intensified professional, technical, and educational roles for VET practitioners, especially among teachers, workplace assessors, and supervisors

(see also Callan, 2004). According to Callan (2004), in recent times, funds from large and successful industry partnerships and fees from international students and consulting activities, to name just a few developments, have provided some of the extra funding, which VET institutions have been able to invest into strategic innovation initiatives.

As already advanced, international organisations, namely the EU, have also been playing an important role in the stimulation of innovation in VET. The EU LEONARDO programme pilot projects have sought to develop and transfer innovation in VET. The main outputs of the programme have been the development of new training approaches or training courses and the production of vocational guidance services/products. Similarly, UNESCO's UNEVOC work focuses on best and innovative practices concerning technical and vocational education and training – particularly for developing and post-conflict countries – using tools such as networking, knowledge sharing and publications, interagency collaborations and partnerships, advisory services and training, and human resources development. The ILO has been active in research in innovations in VET, focusing particularly on social-dialogue and partnerships.

Next is an analysis of the innovation processes and policy making, within which these stakeholders operate.

Innovation processes and policy making

Mulgan and Albury (2003) propose a model of innovation encompassing the following four steps:[1]

- *Generating possibilities*: Ideas for innovation are stimulated and supported;
- *Incubating and prototyping*: Mechanisms are used to develop ideas and manage associated risks;
- *Replicating and scaling up*: Successful and effective innovation is promoted and timely diffused;
- *Analysing and learning*: Innovation is evaluated with an aim to promote continuous learning and improve public services.

At this point, it is useful to provide some further clarification on the relationship between these steps and the different stakeholders introduced in the previous section. To that end, it will help to distinguish between sponsors and advocates of an innovation. Whereas a sponsor is an individual, group, or organization that has the authority to legitimise and the power to enforce an intervention (often by exercising rewards and pressure), an advocate wants to achieve a change but lacks the authority to sanction it. Advocates tend to be

more active at the generation and incubation phases (although they can provide support throughout the implementation of the innovation), trying to convince sponsors to replicate and scale up. Individual teachers and students, private companies, for-profit entities, non-for-profit organisations, charitable foundations, and international organisations often take the role of advocates of innovations. Ultimately, government, public innovation agencies, schools/training organisations (through legislation/regulations), and individual teachers need to take the role of sponsors for the innovation to be implemented by frontline staff – often teachers. The reminder of this subsection covers the first three stages of the innovation processes as defined by Mulgan and Albury (2003). The role of analysis, learning, and evaluation is then covered in a separate subsection.

Generating possibilities, incubating and promoting

Over the past decade, theory and research on the adequate conditions for the generation of innovation at the system level have grown in sophistication, yet this research has focused much more on education than on VET. Using longitudinal analytic techniques, education scholars have remedied the methodological limitations that accompanied early reliance on cross-sectional designs. Scholars also have developed models that are increasingly comprehensive in their explanatory scope and trespass old divisions. Indeed, some studies now provide integrated social, economic (*e.g.* many studies emphasise that socio-economic development is likely to influence the adoption of innovations in education, as they can be resource-intensive), political (*e.g.* degree of centralization, degree of professionalization of civil servants, and levels of inter-party competition for instance), and diffusion-related explanations of innovation (McLedon *et al.*, 2005).

Among political determinants of innovation in education, the role of organizing the public sector along the centralisation-decentralisation continuum is a key factor in generating innovation in education. In this respect, countries such as the United States have experimented with radically different models, and their experience can be enlightening. In the 1950s and 1960s, United States states centralised decision-making processes by granting regulatory co-ordinating boards greater power and responsibility to make centralised academic and fiscal decisions for an entire state, supplanting advisory co-ordinating boards that interfaced previously with governmental institutions. Among the supposed benefits of centralised planning and policy development, it was argued, was greater state policy innovation (Callan, 1975; McConnell, 1962; Mortimer and McConnell, 1982). The nonpartisan professionals that would staff the new state-level boards would bring increased technical knowledge and analytical capacity to bear on the management of postsecondary systems, thereby providing elected officials (*e.g.* legislatures and governors) and their staffs with new ideas for improving postsecondary access, quality,

affordability, and productivity (McLedon *et al.*, 2005). In the 1980s and 1990s, however, there was a re-structuring of the system governance patterns (Marcus, 1997) with a tendency toward "deregulation" and "decentralization" to the local level (campus) (Couturier, 2003; MacTaggart, 1998; Schmidt, 2001). A frequent argument at the time was that centralised governance might inhibit policy innovation in the postsecondary arena because government bureaucracies are inherently resistant to new ideas (Berdahl and MacTaggart, 2000; Hebel, 2000; MacTaggart, 1998). McLedon *et al.*, (2005) provides one of the few studies that test empirically how decentralisation affects innovation, covering the case of the US. They report that centralised governance arrangements are positively – albeit weakly – associated with governmental adoption of new postsecondary financing policies, but not accountability policies. This finding appears to offer modest support for the claim made during the 1960s, and subsequently tested by Hearn and Griswold (1994), that centralised governance structures may spur state governments to adopt certain innovative postsecondary policies. No similar study looking at the relationship between governance patterns and innovation in VET was found during this review. Stasz and Bodilly (2004) do explore how the degree of centralization of a system (measured by the number, and degree of authority, of agencies involved in decision-making and delivery of educational services) affects its capacity for policy change – including innovative change – but with a methodology less sophisticated than those of studies conducted for education, such as McLedon *et al.* (2005). It concludes – as do McLedon *et al.* (2005) – that centralised systems were more likely to implement innovations in certain areas*, i.e.* case standards, graduation requirements and assessment.

As already mentioned, the use of pilots has played an important role in incubating, promoting, and generating possibilities for innovation in VET. There indeed exists a more extensive use of pilots as incubators of future innovations in VET in relation to education as well as a greater role by international organisations in this area, particularly the EU. Looking at the role of international organisations and their piloting approach in incubating and promoting innovation, the evaluation of the LEONARDO II programme (ECOTEC, 2008) found that the role of the programme has been greater in the incubation and promotion of innovation than in the diffusion of innovation (see also next subsection). A substantial proportion of LEONARDO pilot projects had only had a modest impact on policy making, particularly in old member states – impact was greater in new member states, given their initial conditions. Project co-ordinators described the limited scope of their projects as the main reason for low impact. Whereas the programme created many valuable outcomes, they must still be better embedded into policy making processes to achieve their full impact. In this respect, greater dissemination and valorisation of results could prove useful (Janssen, 2002; ECOTEC, 2008), although this approach still faces some limitations.

Examples of government initiatives to promote innovation in VET can also be found at the national level (see, for examples across a large number of countries, Gill *et al.*, 2000). Stasz and Bodilly (2004) provide an evaluation of the role of USA federal and state policies in improving the quality of VET in secondary schools within the context of the Perkins Vocational and Technical Education Act of 1998 (Perkins III Act), which included innovation initiatives, such as the ill-defined (Stasz and Bodilly, 2004; Stasz and Grubb, 1991 for a discussion in relation to Perkins II) but central concept of integration of vocational and academic education through, amongst other tools, curricular innovations. However, this review offers limited specific information on the role of governance patterns in generating possibilities for innovation at the policy level in VET. Callan (2004), in a study based on the experience of Australian VET providers, outlines specific suggestions on how to incubate and promote innovation below the policy level, namely in individual VET organisations (see also section below in this chapter on the conditions that facilitate innovation and barriers for a more general discussion, as well as Chapter 4 specifically on barriers and drivers). These are as follows:

- Bring new ideas into the organisation, encourage staff to attend **conferences and workshop**s, to join **professional groups**, and to bring in **outside experts** who have different or new opinion about issues.
- **Provide seed funding,** which can be applied to initiate new projects. Initially, this funding might be limited to buying-out staff time to allow them the time to progress their ideas to some form of innovation or concept plan.
- Select and promote those **partnerships** that allow the organisation to develop its skills and knowledge, and to have staff work closely with partners through s**hared working arrangements, job rotations, and exchanges of staff**.
- As an organisation, identify whole-of-enterprise issues that can best be resolved through **cross-functional teams** with members from various business divisions in the organisation.
- Encourage the broad concept of **communities of practice**, including time for staff to meet informally and socially with others from inside and outside the enterprise to facilitate the sharing of knowledge and practical experiences.
- Build the **expectation** among staff and members of the institution's board of management that staff will be putting new ideas and projects to the board for consideration, debate, and potential endorsement.
- Define and publicise a simple **process which staff can work through to propose new ideas** for initial consideration.

- Include within organisational **websites details about innovations being considered**, and invite those from both inside and outside the organisation to email comments and advice about how the idea might be further progressed.
- Implement recognition programs that **publicly support** and celebrate innovative solutions to teaching and learning and to partnering and related activities.
- Encourage innovative **ideas from students** though the sponsorship of enterprise competition in which students can compete for cash and in-kind support to take their innovations to market.

Erlt and Kremer (2006) note that the greater degree of stability (*e.g.* less staff fluctuation) of German vocational colleges (*Berufsschulen*), as compared to English FE colleges, also seems to allow lecturers to reflect more freely on innovative practices in general. The next subsection looks at innovation diffusion.

Diffusions: how do benefits escalate?

Rogers (1995) reviews around 900 empirical publications concerning the diffusion of innovation in non-educational contexts and conceptualised the process of adoption and diffusion of innovation in probably the most influential and widely used model (for a critique of Rogers' model see Ferrier *et al.*, 2003), which is based on five stages and can be summarised as follows:

- *Knowledge*: knowing what the innovation is, how it works, and why it works.
- *Persuasion*: forming a personal or professional attitude toward the innovation.
- *Decision*: deciding to reject or adopt it on a partial basis for assessing its usefulness.
- *Implementation*: putting it into use, experiencing problems with uncertainty about its outcomes, re-inventing it for various reasons, and integrating it into ongoing practices.
- *Confirmation*: seeking reinforcement for previous decisions, which may involve reversing this decision because of conflicting messages.

This general model has been used in an educational context, amongst others, by Cheung (1999), who concludes that Rogers' model appears to be applicable in the educational field. The implementation stage which Cheung, however, notes appears to be much more complicated than that in the Rogers Model and could be refined into four phases of implementation – experiment

phase, adjustment phase, mastery phase, and personalisation phase. As the above conclusion is derived from a case study of eight teachers, the findings need to be verified by a large scale of research across different educational innovation as well various working contexts and cultures.

The Glennan *et al*. (2004) study for RAND also provides substantial information on how educational reforms can "scale-up" through mutual adjustment, covering a wide set of educational initiatives that have taken place over the last 20 years. The model could be considered an attempt to represent synthetically the stages of diffusion (*e.g.* as attempted in Rogers 1995) with the role of key stakeholders in processes of change.

Hull *et al*. (1973) cover VET specifically and add to the discussions on the diffusion of innovation by going beyond the outline of stages for diffusion and the role of stakeholders in that process to the development of a conceptual framework to understand both structural (the basic elements of the phenomenon) and relational aspects of the phenomenon of diffusion. Their framework thus outlined three relational conditions and five structural conditions of diffusion. These conditions are:

- *Antecedent conditions*: The ingredients that form the "substance" of the diffusion event, without which the event of diffusion cannot occur; this is a relational dimension and consists of the following structural dimensions:
  - *Change advocate*: The initiator (individual, group, organization, institution, or culture) of the diffusion event.
  - *Targeted consumer*: The ultimate user (individual, group, organization, institution, or culture) of the innovation, rather than any instrumental targeted audience.
  - *Innovation*: A product its form and characteristics, which can be viewed differently by the change advocate and the consumer.
- *Interaction conditions*: The synthesis of the antecedent elements; this is a relational dimension and consists of the following structural dimension:
  - *Strategy-response*: A dimension that consists of the strategy initiated by the change advocate; the response – rejection, resistance, acceptance – initiated by the targeted consumer; and the strategy-response relation, in which the change advocate and the targeted consumer are found at a given point in time. The strategy itself is conceived to consist of the level – individual, group, organization, culture – at which the message is being targeted, the communication linkage modes (*e.g.* media or personal); and the strategy style – coercive, persuasive, or re-educative.

- *Consequent conditions*: The result of a diffusion model; this is a relational dimension and consists of the following structural dimension:
  - *Impact*: Change in the advocate, targeted consumer, and/or innovation. The changes can be in terms of cognitive effects, affective effects, and/or behavioural effects.

No empirical study has been found in this review applying this framework.

Innovation diffusion patterns among political entities have also been related to geographical proximity, as nearby entities enter into a system of emulation and competition as described in Walker (1969) (see also McLedon *et al.*, 2005). In the processes of diffusion, the initial form of an innovation may be altered. The study of policy reinvention (Glick and Hays, 1991) argues that as states seek to learn from their neighbours' past successes and failures when making their own policy choices, policies may change substantially as they spread from state to state. Thus, states may adopt different forms of a policy innovation, depending on whether adoption occurs earlier rather than later. In the process of diffusion, successful innovations can also become unsuccessful (Rogers, 1995).

Conditions that facilitate implementation and barriers

An important question is what factors facilitate or make it more difficult to innovate. The work of Ely (Ely 1999, 1990) systematised a range of conditions that facilitate innovation and has been widely used in educational research (*e.g.* Bauder, 1993; Jeffery, 1993; Read, 1994; Stein, 1997; Ravitz, 1999):[2]

Dissatisfaction with the status quo: refers to an emotional discomfort resulting from the use of current processes or technologies that are perceived as inefficient, ineffective, or not competitive. This affective state is either self-induced or results from organizational awareness or leadership campaigning for the need to change.

Adequate Time: refers to the willingness for organizations to provide paid time for users to learn the new skills or procedure to use the innovation, as well as the user's willingness to devote time to develop these new skills. It also represents individuals' belief that they can successfully adapt to the change.

Resources: refers to availability and accessibility to resources needed to implement the innovation. Resources include finances, hardware, software, materials, personnel, and technological support.

Knowledge and Skills: refers to users possessing, and/or acquiring through training, the needed skills and knowledge to employ the innovation.

Rewards and Incentives: refers to either intrinsic or extrinsic rewards that result from using the innovation and vary from user to user. External rewards are provided to intended users as means to motivate them to employ the innovation.

Participation: refers to the level of involvement stakeholders have in the decision-making process – from design to evaluation – to adopt and implement an innovation. Participation may take the form of user group representatives if it is difficult to get feedback from all potential users.

Commitment: refers to "visible" support – beyond verbal commitment (*e.g.* through the development of strategic plans, dedication of resources, etc.) – by the upper level leaders or powerbrokers. The key to this condition is the users' perceptions of the powerbrokers' commitment to the implementation of the innovation.

Leadership: refers to the level of ownership and support given by the leaders who will manage the daily activities of those using the innovation.

The innovation process is also mediated by the factors of environmental turbulence (Zaltman *et al*., 1973), autonomy (Blau, 1973), and availability of slack resources (Holdaway *et al*., 1975). Similarly, the policy reinvention literature (Glick and Hays, 1991) suggests an additional dimension on which to analyze postsecondary diffusion patterns: the degree of controversy that surrounds a policy or practice.

Mitchell (2003) identifies a number of "macro-drivers" meant to specifically refer to innovation in VET:

- *Changing structures of work*: In particular, part-time, casual or contingent, and shadow workforces are growing, while the standard employment model based on fixed hours, long tenure, and prescribed benefits is declining and work organisations are decentralising.
- *The changing structures of industry and employment*: There exists a need to continue modernising traditional industries and increase focus on competitive alignments among markets, work organisation, skills, and professional standards for high performance workforces. In this scenario, training, retraining, and replacement training are critical for both organisations and individuals.
- *The dynamic knowledge imperative*: The economic and commercial value of knowledge and skills, and especially know-how, is increasing.

- *Public policy*: Governments continue to redevelop their positions on society and economy and within the constraints of their limited revenue and tax base they need.
- *New technology*: The spread of digital communications is increasing the need for information technology (IT) literacy and fluency across many workforces and is challenging the VET system and its staff to model and lead this type of learning, where and when it is relevant. Changes in technology alter the way in which people carry out their normal work tasks and often require new learning by staff in industry and VET providers.
- *Shrinking time horizons*: Options such as e-learning potentially provide some solutions for the "time poor" worker who is keen to stay abreast of the developments in their field.
- *From mass production to market segmentation*: Agility in delivering training that matches the particular preferences, wants, and needs of different clusters and market segments is a discipline of increasing importance.

These macro-drivers may affect the need to be innovative in VET, but they do not specify the practices in which highly innovative VET institutions are engaging. These practices have been studied by Callan (2004), who reports six; they are:

1. Create learning cultures that promote innovation as a **core capability**
2. Have leaders who are **failure tolerant**
3. **Identify** their innovators
4. **Reward** people who bring forward new ideas
5. Use **partnerships**
6. Promote innovation through **teams**, teamwork, and communities of practice.

Callan reports that VET providers are predominantly making use of only three of these six facilitators of innovation: identification of innovators, partnership with industry, and teamwork. They are experiencing a gap between the rhetoric about innovation and its funding and are in need of more leaders who, rather than just playing around the edges, want to build corporate cultures that deeply value innovation and innovators.

VET organisations identify their champions of innovation, who typically operate in partnerships with various specialists, such as business development managers, business managers, enterprise officers, and partnership managers.

However, with the exception of funding to release staff from teaching or other responsibilities, the organisations are generally still working through how to reward or more fully support their innovators (Callan, 2004). Some technical and further education institutes in Australia, Callan reports, provide a wider range of examples of how innovation can be rewarded through other means, such as the provision of awards and prizes to those responsible for the innovation. These rewards included additional access to training opportunities and both national and international visits to view ways in which other institutions are promoting learning and innovation. Such reward systems, according to Callan, make innovation more tangible and serve to demystify the concept for staff. At another level, Callan's study reports how other institutions have engaged in teacher foreign exchange programmes designed to bring new teaching methods and skills to them.

Innovation in VET organisations is also being driven through the development of training partnerships with industry. Callan reports that of the six characteristics of innovative organisations, this was by far the most dominant strategy in shaping and driving innovative thinking and practice. Industry training partnerships promote more flexible training programs, good financial returns, and staff development opportunities for both VET and industry organisations. The partnerships have allowed for experimentation and fine-tuning of practices, resulting in flexible and individualised training, as well as customisation of training, blended models of delivery, the use of workplace assessors, and the mapping of competency development within existing workplace projects.

However, VET organisations are engaging in innovation with little time and without financial rewards for their efforts. Moreover, there appears to be little evidence that VET organisations have established either well-developed organisational capabilities for innovation or clear structures for rewarding innovators. Given the financial and operational constraints faced by organisations in the VET sector, this is understandable. Yet, there is still tremendous potential in the VET sector, argues Callan, to increase innovation within their enterprises.

Zalman and Duncan (1977), on the other hand, provide an influential analysis of the conditions hindering innovation. They identify 18 factors, comprising four major categories of barriers that focus on increasingly smaller units of reference:

- *Cultural barriers*: cultural values and beliefs, cultural ethnocentrism, incompatibility of a cultural trait with change, "saving face" ("I can't do that; I'd never live it down");

- *Social barriers*: group solidarity, rejection of outsiders, conformity to norms, conflict among different factions, group introspection (inability to see problems objectively);
- *Organisational barriers*: threat to power and influence, organizational structure (*e.g.* need to reform more than one department), behaviour of top-level administrators, climate for change in organization opposed to change, technical barriers for resistance;
- *Psychological barriers*: perception (*e.g.* inability to envision change), homeostasis (innovative change can be uncomfortable), conformity and commitment (*e.g.* "this is not the way people do things in my profession"), personality factors (*e.g.* "this change is not right for who I am").

Recently, the US Department of Education (2006) reported that both state and federal policy makers have failed to prioritise support for innovation by not adequately providing incentives for individuals, employers, and institutions to pursue more opportunities for innovative, effective, and efficient practice. This study singled out "lack of incentives" as a key barrier to innovation. The report recommended developing improved accountability measures and creating a consumer-friendly information database on available provision with reliable information on institutions, coupled with a search engine to enable students, parents, and policy makers to compare institutional performance. Besides this, the report encouraged educational institutions to develop new pedagogies, curricula, and technologies to improve learning. This would be partly funded through a revitalised Fund for the Improvement of Postsecondary Education (IPSE) within the context of a more clearly defined national strategy for lifelong learning. In this strategy, institutions should be required to expand their reach to adults through technology (*e.g.* distance learning), workplace learning, alternative scheduling programmes, and the facilitation of credit transfer. Finally, it called for institutions to harness the power of information technology by sharing educational resources among institutions and using distance learning to meet the needs of rural students and adult learners. It also urged states and institutions to establish course redesign programmes using technology-based learner-centred principles that draw upon innovative measures already in place in these areas. In the next sub-section we examine the fourth element in Mulgan and Albury's (2003) model: the relationship between educational research capacity and innovation in education.

Educational research capacity and innovation in VET

Almost 40 years ago, Lilly wrote that "the technical soundness of an innovation as demonstrated by educational research is seldom necessary and never sufficient to guarantee adoption of that innovation by educational practitioners" (1973, p. 227). OECD's work on knowledge management has recently highlighted that still today educators tend to be reluctant to exploit the motors of innovation (contrary to what many other sectors do), including research knowledge in education and related fields. It is argued that research and development lack both the support and the capacity they need to effect change and promote innovation, and they have only weak links with policy and innovation (OECD, 2007). The results of scholarly research on teaching and learning, indeed, are rarely translated into practice, especially for those working at the grassroots level in fields such as teacher preparation (see also OECD, 2003; US Department of Education, 2006).

Some of the suggested solutions to improve the current situation consist of effective brokerage and promoting collaborative forms of professional development to ensure that the current research directly informs the practice of teachers in schools and classrooms. Also, too much educational decision-making is preoccupied, in the short-term, with disincentives to innovate. Accountability regimes, when testing for a very limited range of knowledge and capacities, can also be so punitive as to stifle any genuine initiative, promoting neither quality nor innovation (OECD, 2007).

To qualify some of the statements provided above, a distinction can be drawn between commissioned and non-commissioned research in education, including education innovation, and who commissions that research.[3] Much academic research on education is not seeking to inform policy, nor is it suitable for doing so. Equally, "government is not applied research" (Silva, 2008): experimentation cannot be freely applied, without further considering the consequences over its subjects; political constraints (rather than scientific evidence) may also play a strong role over the range initiatives that can be implemented. Of the research that could be suitable for informing policy, much may not influence it simply because it does not reach decision-makers, but there are other factors as well (*e.g.* lack of resources). Commissioned research tends to have stronger links to policy and practice because there is an organization behind it that has both an interest in the research topic and "power-resources" to implement action following the research results. The link between research and action is stronger when the commissioning organization is the decision-maker.

There are instances in which research not directly commissioned by the decision-maker can have a significant impact on policy too. Ertl (2006) analysed how PISA has influenced the political discourse, curriculum development processes (growing importance of outcome control, competence-orientation

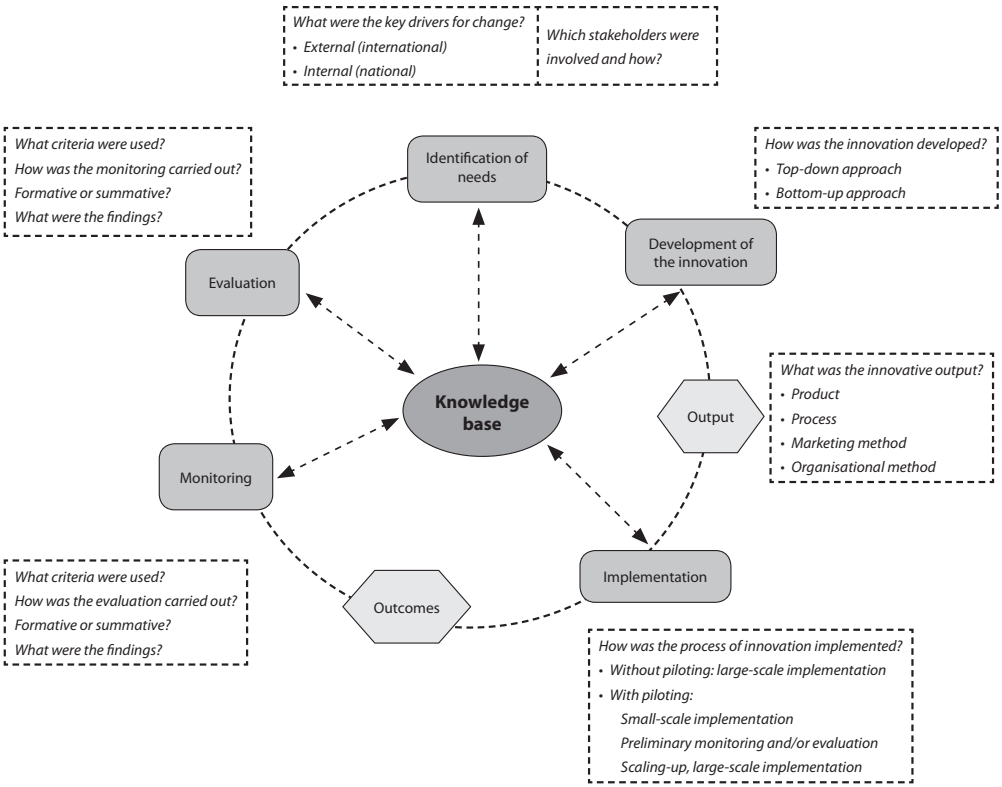
and external assessment), and the academic discourse on compulsory education in Germany. Moreover, Ertl argues that changes in the political discourse resulted in a wide-ranging reform agenda, including – most significantly – the introduction of national educational standards as well as an increased importance of empirical research on pedagogic practice and comparative education. European Commission research has also stimulated innovative national policy making in vocational training (Souto-Otero *et al.*, 2008).

Overall, however, greater links between research and practice are yet to be developed in most countries. Research conducted by the Centre for Global Development (Savedoff *et al.*, 2006) for the Gates Foundation looked specifically at the role of impact evaluation on policy making in several social areas, including education and training, and revealed both a substantial gap between what is known and actual policies and under-investment in evidence-based social development policy. Thus, the authors explain that rigorous studies of job training, conditional cash transfers, and nutrition interventions only in a few countries have guided policy makers to adopt more effective approaches, encouraged the introduction of such programmes to other places, and protected large-scale programmes from unjustified cuts. By contrast, a dearth of rigorous studies on teacher training, student retention and many other important programs leaves decision makers with good intentions and ideas but little real evidence of how to effectively spend resources to reach worthy goals. While governments and agencies regularly seek ideas and guidance to develop new programmes or to improve existing ones, they frequently do so on time frames and budgets that do not allow rigorous evidence to be developed. These institutions may do well in their normal data collection and evaluation tasks related to monitoring inputs, improving operations, and assessing performance, but they largely fail in building knowledge because doing so requires studies that fall outside normal budget and planning cycles and incentives are sorely lacking (Savedoff *et al.*,2006). However, communication of research findings is not the only challenge. In addition, research capacity is often lacking (IBRD, 2005).

Model of innovation in education

The following figure presents a model of innovation in education from a systemic perspective, created by the OECD for this study of systemic innovation. It provides a background to the analysis of the case studies and the subsequent elaboration of a typology of innovations in VET, and includes the potential stages and elements of the innovation process in education, taking a number of elements discussed above into account. The square shaped boxes contain a number of key questions (with some typical options) that arise in the systemic analysis of innovations.

Figure 3.2. **Model of systemic innovation in education**



This model views innovation as a cyclical and iterative, rather than linear, process. Throughout the process it may be necessary to return to previous stages. For instance, if the implementation process involves a pilot and the results of the preliminary evaluation are negative, it may be necessary to return to the stage of "development of the innovation".

Some stages in the model represent processes (*e.g.* development of the innovation), while others could be qualified more as "products" (*e.g.* the output of the innovation process). The process elements of the model are in square shaped boxes, while the non-process elements are in hexagonal boxes. This distinction is important for creating a clear view of the overall innovation process. The "output" of the innovation process is always innovative: it is a new or significantly improved product, process, marketing method, or organisational method. However, while the process elements may be innovative themselves (*e.g.* an innovative way of identifying needs), they are not necessarily so. What is required is that they are necessary steps to produce an innovative output.

The stages of the model

This section presents the different elements of the model presented above, describing different ways in which each stage may take place, as well as providing some illustrative examples from cases studied in the field of VET. It should be noted that in practice some stages of the model may be omitted. For instance, an innovation may be monitored but not evaluated, or conversely evaluated without continuous monitoring.

Identification of needs. The innovation process begins with identifying an area where improvements can be made, *e.g.* a lack of skilled workers in a particular sector. Two aspects of this stage are important for a systemic analysis of innovation: the drivers of change and the stakeholders involved.

- Drivers of change: A number of factors affect this stage, such as diverse policy pressures, media, and public perceptions. Such factors, or drivers of change may, come from within the country (internal drivers) or from abroad (external). In some case studies, international, external drivers had an important role in the innovation process. The *Step One Forward* programme (Hungary) was introduced with substantial EU support under the framework of the Structural Funds, Human Resource Development Programme. Another illustrative example is the *Playa del Carmen Project* (linking public and private resources to improve worker preparation and training in the Mayan Riviera, Mexico), which was developed in co-operation with the Inter American Development Bank. External factors, however, may be important drivers of innovation without the involvement of international organisations as well. In Denmark, efforts to reduce drop-out rates and increase completion rates in VET were made as a follow-up to the Globalisation Council's recommendations, which aimed to help the country face the challenges of globalisation. In many cases, the innovation process was mainly internally driven and often initiated by the civil service (*e.g.* building a research and statistical evidence base for Australian VET).
- Stakeholders involved: This stage may involve various stakeholders, including government officials, international organisations, employers' organisations, VET institutions, researchers, etc. There may be great variation among innovations in the range of stakeholders involved and in the ways in which they are involved.

Development of the innovation. After the identification of a need (*e.g.* a lack of skilled workers), the following step is to develop the innovation that will address the need (*e.g.* a grant scheme to attract young people into a specific VET programme). This stage implies the process of elaborat-

ing the innovation, *e.g.* elaboration of a new curriculum, a particular grant programme, or a network of institutions.

- An important feature of this stage is whether it is driven by public authorities in a top-down or developed through a bottom-up approach. In most cases, such as the follow-up to the Globalisation Council's recommendations for a VET system fit for the future (Denmark), the implementation process was a predominantly top-down one. Conversely, a bottom-up approach was dominant, for instance, in the technical baccalaureate reform in Mexico, where teachers played a key role in the design of the new programmes as well as in the implementation and evaluation of the reform.
- Another aspect of this stage is the different types of stakeholder it involves. Examples of stakeholders involved in the development of innovations include officials from public authorities, representatives of employers, VET institutions (school leaders and/or teachers), and academic experts.
- **The output of innovation.** The result of the development work is an innovative output, which can take different forms. The following section provides a brief definition of the types of innovation suggested by the Oslo Manual (OECD and Eurostat, 2005), as well as some illustrations from the field of VET.
- *Product*: A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. An example in the field of VET is the *Step One Forward* programme (Hungary), which introduced a new service to encourage low-skilled workers to engage in VET.
- *Process*: A process innovation is defined by the Oslo Manual as the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software production, and delivery method. An example for process innovation in VET is the *Flexible Learning Framework* (Australia), which introduced new infrastructure and expertise into the provision of e-learning.
- *Marketing method*: A marketing innovation is a new marketing method involving significant changes in product design or packaging, product placement, product promotion, or pricing. They aim to better meet customer needs by opening up new markets or by newly positioning a firm's product on the market. The Australian initiative of increasing the status of VET illustrates how the "marketing method" type of innovation may be realised in VET. This initiative aims to

change the status of VET and to "newly position" VET programmes on the market of educational services.

- *Organisational method*: An organisational innovation is a new organisational method in the firm's business practices, workplace organisation, or external relations. They deal mainly with people and the organisation of work. An example of organisation innovation in VET is the creation of *Leading Houses* (Switzerland), which involved the establishment of a network of academics.

Implementation. An innovative initiative may be implemented initially on a small scale, through a pilot aiming to "try out" the innovation before proceeding to its large-scale implementation. When a pilot is used, it is typically followed by a preliminary evaluation, which assesses preliminary outcomes. If the preliminary outcomes meet the initial expectations (*i.e.* the innovation seems to bring the expected results), the innovation may be scaled-up, *i.e.* transferred from small-scale to large-scale. If the preliminary evaluation shows that the innovation does not bring the intended outcomes, it may be necessary to return to previous stages, such as the development of the innovation. Alternatively, the innovation may be immediately implemented on a large scale without a previous pilot.

Outcomes. The outcomes are the impacts or consequences of the innovative initiative, for instance changes in completion rates as the consequence of a project targeted at potential drop-outs. In this model, outcomes are represented as a "product" rather than a process, since the outcomes represent the results of the innovation.

There may be an "implementation gap" (Newton, 2001), defined as the difference between planned outcomes of policy and the outcomes of the implementation process. Possible reasons for such a gap include a theoretical mechanism that does not work in practice and an ineffective implementation process. Such an implementation gap may be revealed through monitoring and evaluation (see below).

Monitoring. Monitoring can be defined as the continuous surveillance of the implementation and/or progress of an initiative. It tracks progress against a predetermined schedule and aims to provide stakeholders with regular feedback and early indications of progress or lack thereof in the achievement of planned outcomes (UNFPA, 2004). Three key questions may be asked about monitoring from a systemic analysis perspective: How was the process monitored? What were the criteria used? What were the findings?

Evaluation. Evaluation is a judgement of whether the initiative has met its intended outcomes. It assesses the outcomes of an innovation (*e.g.* changes in completion rates) against the objectives set at the beginning of the process (*e.g.* reduce drop-out by a given percent). The questions arising regarding this

stage are similar to the ones mentioned in the case of monitoring: How was the process evaluated? What were the criteria used? What were the findings?

The distinction between monitoring and evaluation may not be obvious in practice. The two processes are often related and use the same tools. For example, evaluation often uses information from monitoring in addition to other data sources to judge the results. However, an important difference between the two techniques is that monitoring is a continuous process that tracks ongoing or incremental progress, while evaluation is a one-off or periodic judgement of results.

The approach to monitoring and evaluation can be *formative* or *summative* (or both). Formative monitoring refers to frequent, interactive review of progress towards specific pre-set goals, with an underlying aim of identifying both strengths and weaknesses to inform and improve practice (throughout the monitoring period, for example). Formative monitoring/evaluation aims to improve the object under scrutiny by identifying weaknesses, providing feedback, and suggesting strategies for improvement, and by supporting the implementation of these strategies (OECD, 2005). Summative evaluation, in contrast, is focussed on providing a single judgement on the outcomes of the object being evaluated. It generally judges success or failure and may not feed back in to the continuing development of the innovation.

The central role of knowledge

The knowledge base lies at the heart of the process of innovation, with each stage feeding into the knowledge base and the knowledge base providing input into each stage. For example, evaluation uses existing knowledge while its conclusions expand the existing knowledge base.

A basic distinction can be drawn between explicit and tacit knowledge (Polanyi, 1966). Explicit knowledge can be precisely and formally articulated. Therefore, although more abstract than tacit knowledge, explicit knowledge can be more easily codified, documented, transferred, or shared. Explicit knowledge nurturing innovation in VET is typically scientific knowledge that results from research, mostly carried out by universities or other research institutions. However, explicit knowledge is not limited to scientific knowledge. It also includes explicit and codified know-how, *e.g.* a procedure manual used by a ministry based on previous experience.

"Tacit knowledge is subconsciously understood and applied, difficult to articulate, developed from direct experience and action, and usually shared through highly interactive conversation, story-telling and shared experience" (Zack, 1999). In VET, tacit know-how knowledge results from collaboration between diverse stakeholders, teachers and school leaders, public authorities, employers, students, etc.

Development of typology of innovations in VET

The model of innovation in education presented above serves as an analytical tool and helps map systemic innovation in VET. Innovation Questionnaires completed by each country, the background reports provided for each case study, and the case study review visits have helped to provide answers to the questions arising at each stage of the innovation process. This model has been used as the basis for the OECD Secretariat analysis, which begins in Chapter 4. The model is furthermore used to explore issues around the development of a typology of systemic innovation in VET in Chapter 7. The following chapter will explore several of the same themes explored in this chapter, emphasising the literature on vocational education and training.

Conclusions and policy implications

A number of policy lessons emerge from the literature reviewed both on innovation in education and on innovation in vocational education and training. The recommendations address, in particular, actions for government and other public bodies involved in educational innovation policy making. However, these general policy lessons could also often easily be articulated as recommendations for both educational institutions. Although each field has its own particularities, there is substantial overlap in the models and analyses offered for education and VET; thus, a distinction between these two areas is not made in this section. The identified lessons:

There is a greater need to **specify the concept** of innovation. Although the use of different conceptions of innovation is logical, there exists a need to more clearly define the concept in the context of different public initiatives. Otherwise, government demands for innovation will continue to be **too broad** to **incept action** by educational institutions and other stakeholders, and **progress tracking** will be exceedingly difficult to achieve.

Greater priority should be placed on developing **indicators** for educational innovation and systematic **data collection** for monitoring and benchmarking purposes as well as to provide incentives for innovation.

Data collection, benchmarking, and accountability requirements should be **sufficiently flexible** to account for the specific and unforeseeable character of innovation, and they should **not only focus** in the achievement of **short-term** results.

In terms of processes, **partnership work** is crucial. Greater collaborative forms of work must be developed to ensure appropriate planning and implementation of innovative initiatives. This should include, in particular, greater links between **policy makers, the educational research community, and teachers** (front-line deliverers).

The public sector has a key role in the creation of the environmental conditions that can stimulate innovation in education. Governments, however, have so **far failed to make supporting innovation** in education a **priority,** a situation that should be reversed. This would include the establishment of **appropriate incentives** for innovation, the stimulation of greater **research capacity,** and **increased links** with the research and teaching community (see also above). Educational organisations should also strive to make use of a wider range of incentives to innovate, learning from already existing practice.

Moreover, innovations are too often taken and implemented in isolation, *e.g.* without looking beyond their immediate consequences. Governments and individual educational organisations should place a greater emphasis on analysing the consequences of introducing innovations at the **systemic level** prior to the adoption of major innovations.

There are few examples of successful systematic procedures for the **dissemination and mainstreaming** of good practices created from the bottom up (*e.g.* intensive activities of pilot projects). This gap leads to the underuse of many potentially useful innovations and to duplication (or multiplication) of efforts. **Stronger institutionalised systems** should be established for knowledge-sharing, dissemination, and mainstreaming.

Greater analytical efforts should also be put in place to **avoid the adoption of ineffective new practices** from other contexts and to consider the particular **context** to which effective practices are being diffused.

Linked to this point is an **urgent need** to **develop governmental capacity** to assess methodologies, required resources, and time frames for evaluating innovative practices and ideas.

With these conclusions and policy lessons on innovation in education and innovation in vocational education and training in mind, the reader is invited to turn to Part II of the study on empirical work of systemic innovation in vocation education and training.

Key messages

Innovation is a term more often used than clearly defined in education, being employed interchangeably with related terms such as invention, reform, and change.

New ideas, knowledge, and practices, however, can also fail if they do not bring their desired results, impact negatively on other objectives, create new problems, or are not cost-effective.

Therefore, an assessment of whether to implement an innovation requires looking at its implications for other parts of its environment, beyond the immediately affected. However, such kinds of systemic analysis are infrequent.

There are a wide range of stakeholders involved in the process of innovation in VET, with different incentives towards the inception and adoption of innovation and the preservation of the *status quo*.

Commitment and collaboration between these stakeholders is crucial for the creation and success of innovations.

Available evidence points out that VET organisations are not making use of the whole range of facilitators of innovation available to them and are still working through how to reward or more fully support their innovators. Consequently, there is much unlocked potential in the VET sector to facilitate and increase innovation.

Educators and policy makers, on the other hand, have not sufficiently used the motors of innovation, including research in education. Research on teaching and learning from cognitive science, human resources, organizational theory, and other disciplines has thus rarely been put into practice.

Adequate research capacity is lacking even in relatively general areas.

Notes

1. Other models are the CREATER model of Havelock and Zlotolow (1995), the CBAM model of Hall and Hord (1987), and the models developed in Stockdill and Morehouse (1992), Kotter (1996), and Klien and Sorra (1996).

2. See Chapter 6 for a full discussion on barriers and drivers.

3. Data Driven Decision Making in Education (DDDM) may be increasingly important at the school and system level to make decisions – *e.g.* taking into consideration outputs results (see Marsh *et al*., 2006). Although data collection and analysis used for DDDM could be considered in a broad sense as research, we do not include this in this section.

References

Atkin, J. M. (1998), "The OECD Study of Innovations in Science, Mathematics and Technology Education", *Journal of Curriculum Studies*, Vol. 30, No. 6, pp. 647-60.

Aziah, N. and A. Marzuki (2005), "Innovation for Better Teaching and Learning: Adopting the Learning Management System", *Malaysian Online Journal of Instructional Technology*, Vol. 2, No. 2, pp. 27-40.

Bailey, J. R. and C. M. Ford (2003), "Innovation and Evolution: Managing Tensions Within and Between the Domains of Theory and Practice", in L.V. Shavinina (ed.), *The International Handbook on Innovation*, Pergamon, London, pp. 248-58.

Baldridge, J. V. *et al.* (1973), "The Impact of Institutional Size and Complexity on Faculty Autonomy", *Journal of Higher Education***,** Vol. 44, pp. 532-47.

Banathy, B. H. (1968), *Instructional Systems*, Fearon Publishers, Palo Alto, CA.

Banathy, B. H. (1991), *Systems Design of Education*, Educational Technology Publications, Englewood Cliffs, NJ.

Barrow, L., L. Markman and C. Rouse (2008), "Technology's Edge: The Educational Benefits of Computer-aided Instruction", *NBER Working Paper 14240*, NBER, Cambridge, MA.

Bauder, D. Y. (1993), "Computer Integration in K-12 Schools: Conditions Related to Adoption and Implementation", *Dissertation Abstracts International*, Vol. 54, No. 8, 2991A.

Berdahl, R. O. and T. MacTaggart (2000), *Charter Colleges: Balancing Freedom and Accountability*, Pioneer Institute for Public Policy Research, Boston.

Berman, P. and M. W. McLaughlin (1974), *Federal Programmes Supporting Educational Change*, Vol. I: *A Model of Educational Change*, The RAND Corporation, Santa Monica.

Berry, F. S. and W. D. Berry (1992), "Tax Innovation in the States: Capitalizing on Political Opportunity", *American Journal of Political Science*, Vol. 34, pp. 715-42.

Bishop-Clark, C. and R. Grant (1991), "Implementing Computer Technology in Educational Settings", *Journal of Educational Technology Systems*, Vol. 19, No. 4, pp. 313-26.

Blau, P. M. (1973), *The Organization of Academic Work*, Wiley, New York.

Blumenfeld, P. *et al. (*2000), "Creating Usable Innovations in Systemic Reform: Scaling Up Technology-Embedded Project-Based Science in Urban Schools", *Educational Psychologist*, Vol. 35, No. 3, pp. 149-64.

BMBF (2007), *Ten Guidelines for the Modernization and Structural Improvement of Vocational Education and Training – Innovation Circle on Vocational Education and Training*, BMBF, Berlin.

Bober, M. J. (2002), "Technology Integration: The Difficulties Inherent in Measuring Pedagogical Change", *Tech Trends*, Vol. 46, No. 1, pp. 21-23.

Bodilly, S. *et al.* (2004), *Challenges and Potential of a Collaborative Approach to Education Reform*, The RAND Corporation, Santa Monica.

Bruce, B. C., J. K. Peyton and T. W. Batson (1993), *Network-based Classrooms: Promises and Realities*, Cambridge University Press, New York.

Callan, P. M. (1975), "Evaluating Planning by Statewide Boards", in R. O. Berdahl (ed.), *New Directions for Institutional Research: No. 5, Evaluating Statewide Boards*, Jossey-Bass, San Francisco, pp. 14-29.

Callan, V.(2004), *Building Innovative Education and Training Organisations*, NCVER, Adelaide.

Carless, D. R. (1997), "Managing Systemic Curriculum Change: A Critical Analysis of Hong-Kong's Target Oriented Curriculum Initiative", *International Review of Education*, Vol. 43, No. 4, pp. 349-66.

Carr-Chellman, A. and C. M. Reigeluth (2001), "Whistling in the Dark? Instructional Design and Technology in the Schools", in R. A. Reiser and J. Dempsy (eds.), *Trends and issues in Instructional Design and Technology*, Merrill/Prentice Hall, Englewood Cliffs, NJ.

Carr-Chellman, A. and M. Savoy (2004), "Follow the Yellow Brick Path: Finding Our Way Home via Banathy's User-design", *Systemic Practice and Action Research*, Vol. 17, No. 4, pp. 373-82.

CEDEFOP(2005), *Innovative Practices in the Field of Training and Related Professional Development Issues*, Office for Official Publications of the European Communities, Luxembourg.

Cheung, M. Y. M.(1999), "The Process of Innovation Adoption and Teacher Development", *Evaluation and Research in Education*, Vol. 13, No. 2, pp. 55-75.

Chrisman, F. P. and J. Crandall (2007), *Passing the Torch: Strategies for Innovation in Community Colleges ESL*, Council for the Advancement of Adult Literacy, New York.

Christensen, C. M. and M. B. Horn (2008), "How Do We Transform Our Schools?" *Education Next*, Summer 2008, pp.13-19, Hoover Institution, Stanford University, Palo Alto.

Christensen, T. and P. Lærgreid,(2001), *New Public Management: the Transformation of Ideas and Practice*, Aldershot, Ashgate.

Clapham, M. M. (2003), "The Development of Innovative Ideas through Creativity Training", in L.V. Shavinina (ed.), *The International handbook on innovation*, Pergamon, London, pp. 366-76.

Collis, B. and M. van der Wende (eds) (2002), *Models of Technology and Change in Higher Education*, Centre for Higher Education Policy Analysis, The University of Twente, Twente.

Couturier, L. K.(2003), "Balancing State Control with Society's Needs", *Chronicle of Higher Education*, 27 June, p. B20.

Crocker, R. and A. Usher(2006), *Innovation and Differentiation in Canada's Post-Secondary Institutions*, Canadian Policy Research Networks, Ottawa.

Cuban, L. (1996), "Techno-Reformers and Classroom Teachers", *Education Week* (October 9), *www.edweek.org/ew/articles/1996/10/09/06cuban.h16.html?querystring=techno.refor*, checked on 17/08/2008.

Cuban, L. (1999), *How Scholars Trumped Teachers*, Teachers College Press, New York.

Cuban, L. (2001), *Oversold and Underused: Computers in the Classroom*, Harvard University Press, Cambridge, MA.

Curtain, R. (2004a), "Innovation and Vocational Education and Training. Lessons from Leading National Innovation Systems", in S. Dawe (ed.), *Vocational Education and Training and Innovation*, NCVER, Adelaide, pp. 42-58.

Curtain, R. (2004b), *Vocational Education and Training, Innovation and Globalisation*, NCVER, Adelaide.

Dax-Boyer, F. (2005), "Innovation in Training as Reflected in the TTnet France Network", in CEDEFOP, *Innovative Practices in the Field of Training and Related Professional Development Issues*, Office for Official Publications of the European Communities, Luxembourg.

Dalton, D. W. (1989), "Computers in Schools: S Diffusion/Adoption Perspective" *Educational Technology*, Vol. 11, pp. 20-27.

Dhanarajan, G. (2001), "Distance Education: Promise, Performance and Potential", *Open Learning*, Vol. 16, No. 1, pp. 61-68.

Dill, D. D. and C. P. Friedman (1979), "An Analysis of Frameworks for Research on Innovation and Change in Higher Education", *Review of Educational Research*, Vol. 49, No. 3, pp. 411-35.

Drent, M. and M. Meelissen (2008), "What Factors Obstruct or Stimulate Teacher Educators to Use ICT Innovatively?" *Computers and Education*,Vol. 51, No. 1, pp. 187-99.

Driel, van J. H. *et al.* (1997),"Teachers Craft Knowledge and Curriculum Innovation in Higher Engineering Education", *Higher Education*, Vol. 34, pp. 105-22.

Dubner, S. J.(2008), "How Can we Measure Innovation? A freakonomics Quorum", *New York Times Blog*, 25 April 2008, *http://freakonomics.blogs.nytimes.com/2008/04/25/how-can-we-measure-innovation-a-freakonomics-quorum/?hp*, checked on 15/08/2008.

ECOTEC (2008), *Joint report on the final evaluation of Socrates II, Leonardo da Vinci II and e-Learning. Final report to the Directorate General of Education of the European Commission*, ECOTEC Research and Consulting Ltd., Birmingham.

Eib, B. J., and H. D. Mehlinger (1998), "Technology in Education: From Segregation to Integration", *The High School Magazine*, Vol. 1, pp. 10-15.

Ellsworth, J. B. (2000), *Surviving Change: A Survey of Educational Change Models*, ERIC Clearinghouse on Information and Technology, Syracuse University.

Ely, D. P. (1990), "Conditions that Facilitate the Implementation of Educational Technology Innovations", *Journal on Research on Computing in Education*, Vol. 23 No. 2, pp. 298-305.

Ely, D. P. (1999) "Conditions that Facilitate the Implementation of Educational Technology Innovations", *Educational Technology*, Vol. 39, No. 6, pp. 23-7.

Ensminger, D. C. *et al.* (2004), "Factors Contributing to the Successful Implementation of Technology Innovations"; *Educational Technology and Society*, Vol. 7, No. 3, pp. 61-72.

Ertl, H. (2006), "Educational Standards and the Changing Discourse on Education: The Reception and Consequences of the PISA Study in Germany", *Oxford Review of Education*, Vol. 32, No. 5, pp. 619-34.

Erlt, H. and H. Kremer (2006), "Teacher Driven Innovation in College-based VET cContexts: A Comparative Study in England and Germany", *Research in Comparative and International Education*, Vol. 1, No. 4, pp. 351-65.

ETF (2006), *The Reform of Vocational Curricula: Outcomes of the 2005 Peer Reviews in Bulgaria, Bosnia and Herzegovina, the Former Yugoslav Republic of Macedonia and Serbia*, European Training Foundation, Torino.

European Commission (2004), *Innovation through the European Social Fund*, European Commission, DG Employment and Social Affairs, Office for Official Publications of the European Communities, Luxembourg.

European Commission (2007), *Lifelong Learning Programme: General Call for Proposals 2008-2010, Part I: Strategic Priorities*, European Commission, Brussels.

Faudel, H. and P. Grootings (2006), *The Reform of Vocational Education and Training in the Republic of Tajikistan*, European Training Foundation, Torino.

Ferrier, F., C. Trood and K. Whittingham (2003), *Going Boldly into the Future: A VET Journey into the National Innovation System*, NCVER, Adelaide.

Fishman, B. *et al.* (2000), "Fostering Teacher Learning in Systemic Reform: A Design Proposal for Developing Professional Development", paper presented at NARST 2000, New Orleans, LA, 29 April 2000.

Fullan, M. (1982), *The Meaning of Educational Change*, Teachers College Press, New York.

Fullan, M. and A. Hargreaves (1992), "Teacher Development and Educational Change", in M. Fullan and A. Hargreaves (eds.), *Teacher Development and Educational Change*, Falmer Press, London, (pp. 1-9).

Fullan, M. and S. Stiegelbauer (1991), *The New Meaning of Educational Change* (2nd ed.), Teachers College Press, New York.

Fuller, R.B. (1981), *Critical Path*, St. Martin's Press, New York.

Ghaill, M.M.A. (1992), "Student Perspectives on Curriculum Innovation and Change in an English Secondary School: An Empirical Study", *British Educational Research Journal*, Vol. 18, No. 3, pp. 221-34.

Gibbs, G. (2001), *Analsyis of Strategies for Learning and Teaching*, Higher Education Funding Council for England, Bristol.

Gill, I. S., F. Fluitman and A. Dar (eds.) (2000), *Vocational Education and Training Reform. Matching Skills to Markets and Budgets*, Oxford University Press, New York.

Glennan, T. K. *et al.* (2004b), *Expanding the Reach of Education Reforms. Perspectives from Leaders in the Scale-up of Educational Interventions*, The RAND Corporation, Santa Monica.

Glick, H. R. and S. P. Hays (1991), "Innovation and Reinvention in State Policymaking: Theory and Evolution of Living Will Laws", *Journal of Politics*, Vol. 53, pp. 835–50.

Goertz, M. E., R. E. Floden and J. O'Day (1995), *Studies of Education Reform: Systemic reform*, US Department of Education, Washington.

Goldsmith, R. E. and G. R. Foxall (2003), "The measurement of innovativeness", in L. V. Shavinina (ed.), *The International Handbook on Innovation*, Pergamon, London, pp. 321-30.

Gormley. W. T. (1986), "Regulatory Issue Networks in a Federal System", *Polity*, Vol. 18, pp. 595-620.

Green, K. C. (2000), *The 2000 National Survey of Information Technology in US Higher Education*. Accessed 12/08/2008 on *www.campuscomputing.net/summaries/2000/index.html*.

Green, K. C. (2004) *The 2004 National Survey of Information Technology in US Higher Education*. Accessed 12/08/2008 at *www.campuscomputing.net*.

Green, K. C. (2006) *The 2006 National Survey of Information Technology in US Higher Education*. Accessed 12/08/2008 at *www.campuscomputing.net*.

Green, K. C. (2007) *The 2007 National Survey of Information Technology in US Higher Education*. Accessed 12/08/2008 at *www.campuscomputing.net*.

Grootings, P. and S. Nielsen (2005), "Facilitating the Professional Development of Teachers by Engaging Them in VET Reform", in ETF (2005), *ETF Yearbook 2005. Teachers and trainers: Professionals and Stakeholders in the Reform of Vocational Education and Training*, ETF, Torino.

Guellec, D. and B. Pattinsson (2006), "Innovation Surveys: Lessons from the Experiences of OECD Countries", in W. Blankley *et al.* (eds.), *Measuring Innovation in OECD and non-OECD Countries*, HSRC Press, Cape Town.

Gurria, A. (2008), *Drivers for Reform Strategies: Learning and Innovation*, Keynote address by Angel Gurría, OECD Secretary-General, delivered at the Conference marking the 40th Anniversary of OECD's Centre for Educational Research and Innovation (CERI) on "Learning in the 21st Century: Research, Innovation and Policy", OECD Conference Centre, 16 May 2008.

Haider-Markel, D. P. and K. Meier (1996), "The Politics of Gay and Lesbian Rights: Expanding the Scope of the Conflict", *Journal of Politics*, Vol. 58, No. 2, pp. 322–49.

Hajimanolis, A. (2003), "The Barriers Approach to Innovation", in L. V. Shavinina (ed.), *The International Handbook on Innovation*, Pergamon, London, pp. 559-73.

Hall, G., and S. Hord (1987), *Change in Schools: Facilitating the Process*, State University of New York Press, Albany.

Havelock, R.G. (1982), *The Change Agent's Guide to Innovation in Education*, Educational Technology Publications, New Jersey.

Havelock, R. G. and S. Zlotolow (1995), *The Change Agents Guide*, (2Ed.), Educational Technology Publications, New Jersey.

Hearn, J. C. and C. P. Griswold, (1994), "State-level Centralization and Policy Innovation in U.S. Postsecondary Education", *Educational Evaluation and Policy Analysis*, Vol. 16, No. 2, pp. 161-90.

Hebel, S. (2000), "States Start to Consider the Idea of Charter Colleges", *Chronicle of Higher Education*, 24 March 2000, pp. A36–A38.

Heron, R. P. and D. Friesen (1973), "Growth and Development of College Administrative Structures", *Research in Higher Education*, Vol. 1, pp. 333-47.

Herson, K. *et al.* (2000), "Implementation Strategies for Educational Intranet Resources", *British Journal of Educational Technology*, Vol. 31, No. 1, pp. 47-55.

Hess, F. M. and C. E. Finn (2007), "What Innovators Can, and Cannot, Do. Squeezing into Local Markets and Cutting Deals", *Education Next*, Spring 2007, Hoover Institution, Stanford University, Palo Alto, pp. 48-56.

Holdaway, E. A. *et al.* (1975), "Dimensions of Organization in Complex Societies: The Educational Sector", *Administrative Science Quarterly*, Vol. 20, pp. 37-58.

Honey, M., K. M. Culp and F. Carrigg (2000), "Perspectives on Technology and Education Research: Lessons from the Past and Present", *Journal of Educational Computing Research*, Vol. 23, No. 1, pp. 5-14.

Hull, W., R. J. Kester and W. B. Martin (1973), *A Conceptual Framework for the Diffusion of Innovations in Vocational and Technical Education*, The Centre for Vocational and Technical Education, The Ohio State University, Ohio.

Hunter, B. (2001), "Against the Odds: Professional Development and Innovation Under Less-Than-Ideal Conditions", *Journal of Technology and Teacher Education*, Vol. 9, No. 4, pp. 473-96.

IBRD (2005), *Knowledgemaps: ICTs in Education*, IBRD/World Bank, Washington.

Janssen, J. (2002), *Innovations in Lifelong Learning. Capitalising on ADAPT*, CEDEFOP, Office for Official Publications of the European Communities, Luxembourg.

Jeffery, J. A. (1993), "Conditions that Facilitate Implementation of Peer Coaching", *Dissertation Abstracts International*, Vol. 54, No. (8), 2826A.

Johnson, L. G. (1984), "Faculty Receptivity to an Innovation: A Study of Attitudes Toward External Degree Programs", *The Journal of Higher Education*, Vol. 55, No. 4, pp. 481-99.

Jonassen, D. H., K. L. Peck and B. G. Wilson (1999), *Learning with Technology: A Constructivist Perspective*, Merrill/ Prentice Hall, Upper Saddle River, New Jersey.

Jost, K. L. and S. L. Schneberger (1994), "Educational Technology Adoption and Implementation: Learning from Information Systems Research", *Canadian Journal of Educational Communication*, Vol. 23, No. 3, pp. 213-30.

King, N. and N. Anderson (2002), *Managing Innovation and Change*, Thomson, Australia.

Kinser, K. (2005), "Innovation in Higher Education: A Case Study of the Western Governors University", *New Directions for Higher Education*, No. 137, pp. 15-25.

Kirkup, G. and A. Kirkwood (2005), "Information and Communications Technologies (ICT) in Higher Education Teaching – A Tale of Gradualism Rather than Revolution", *Learning, Media and Technology*, Vol. 30, No. 2, pp. 185-99.

Klien K. J. and J. Sorra (1996), "The Challenge of Innovation Implementation", *Academy of Management Review*, Vol. 21, No. 4, pp. 1055-80.

Kostoff, R. N. (2003), "Stimulating Innovation", in L. V. Shavinina (ed.), *The International Handbook on Innovation*, Pergamon, London, pp. 388-400.

Kotter, J. (1996), *Leading Change*, Harvard Business School Press, Cambridge, MA.

Lankshear, C., I. Snyder and B. Green (2000), *Teachers and Technoliteracy: Managing Literacy, Technology and Learning in Schools*, Allen & Unwin, St Leonards.

Larsen, K. and S. Vincent-Lancrin (2006), "The Impact of ICT on Tertiary Education: Advances and Promises", in D. Foray and B. Kahin (eds.), *Advancing Knowledge and the Knowledge Economy*, MIT Press, Cambridge, MA.

Lilly, M. S. (1973), "The Impact (or lack of it) of Educational Research on Changes in Educational Practice", in L. Mann and D. Sabatino (eds.), *The First Review of Special Education*, Vol. 2., JSE Press, Philadelphia, pp. 203-27.

Lou, Y., P. C. Abrami, and S. d'Apollinia (2001), "Small Group and Individual Learning in Technology: A Meta-analysis", *Review of Educational Research*, Vol. 71, pp. 449 51.

Lowi, T. (1964), "American Business, Public Policy, Case Studies, and Political Theory", *World Politics*, Vol. 16, pp. 677-715.

Lloyd-Reason, L., K. Muller and S. Wall (2002), "Innovation and Education Policy in SMEs: A Czech Perspective", *Education + Training*, Vol. 44, No. 8/9, pp. 378-87.

McBeath, C. (1997), "A Strategy for Curriculum Dissemination", *Issues in Educational Research*, Vol. 7, No. 1, pp. 53 67.

McCombs, B. L. (2000), "Assessing the Role of Educational Technology in the Teaching and Learning Process: A Learner-Centred Perspective",

paper presented at the Secretary's Conference on Educational Technology, 11–12 September, Alexandria, VA.

McConnell, T. R. (1962), *A General Pattern for American Higher Education*, McGraw-Hill, New York.

McCoshan, A. and M. Souto Otero (2003), *Further Education Colleges' Views on FE-Employer Links*, *RR442*, DfES, Sheffield.

McLedon, M. K., D. S. Heller and S. P. Young (2005), "State Post-Secondary Policy Innovation: Politics, Competition, and the Interstate Migration of Policy Ideas", *The Journal of Higher Education*, Vol. 76, No. 4, pp. 363-400.

McNaught, C., K. Whithear and G. Browning (1999), "Systems Not Projects: Focusing on Evaluating Overall Student Experience, Rather Than Isolated Innovations", *Higher Education Research and Development*, Vol. 18, No. 2, pp. 247-59.

MacTaggart, T., (ed.) (1998) *Seeking Excellence Through Independence: Liberating Colleges and Universities from Excessive Regulation*, Jossey-Bass, San Francisco.

Malian, I. M. and A. I. Nevin (2005), "A Framework for Understanding Assessment of Innovation in Teacher Education", *Teacher Education Quarterly*, Summer 2005, pp. 7-17.

Marcus, L. R. (1997), "Restructuring State Higher Education Governance Patterns", *Review of Higher Education*, Vol. 20, No. 4, pp. 399-418.

Marinova, D. and J. Phillimore (2003), "Models of Innovation", in L. V. Shavinina (ed.), *The International Handbook on Innovation*, Pergamon, London, pp. 44-53.

Marsh, J. A., J. F. Pane and L. S. Hamilton (2006), "Making Sense of Data Driven Decision Making in Education", *RAND Education Occasional Papers*, The RAND Corporation, Santa Monica.

Mead, S. (2007), "Easy Way Out? 'Restructured" Usually Means Little Has Changed", *Education Next*, Winter 2007, pp.52-6, Hoover Institution, Stanford University, Palo Alto.

Means, B. (1994), "Introduction: Using Technology to Advance Educational Goals", in B. Means (ed.), *Technology and Education Reform*, Jossey-Bass Publishers, San Francisco.

Microsoft (2007), *Innovative Teachers: Understanding, Developing and Managing Innovation. A Report on the Innovative Teachers' Forum*, Microsoft Corporation, *http://download.microsoft.com/*

download/2/5/9/259f7395-bd6a-45d0-bbe2-cb7cbc3e16a7/Innovative_Teachers_2006.pdf, checked on 01/09/2008.

Mintrom, M. (1997), "Policy Entrepreneurs and the Diffusion of Innovation", *American Journal of Political Science*, Vol. 41, pp. 738–70.

Mitchell, A. G. (1998), "Strategic training partnerships between the State and enterprises", *Employment and Training Papers* 19, ILO, Geneva.

Mitchell, J. M. (1992), "The Keys to Successfully Managing the Change to Open Learning", *Conference Proceedings of the ITTE Annual Meeting*, Brisbane, Australia.

Mitchell, J. M. (2003), *Emerging Futures: Innovation in Teaching and Learning in VET*, ANTA, Melbourne.

Mitchell, J. and S. Young (2001), *High-skilled, High-performing VET*, ANTA, Melbourne.

Mohr , L. B. (1969), "Determinants of Innovation in Organizations", *The American Political Science Review*, Vol. 63, No. 1, pp. 111-26.

Moller, G. (1993), "The Consultant as Organizational Change Agent", *New Directions for Adult and Continuing Education*, Vol. 58, pp. 73-9.

Mooney, C. Z. and M. H. Lee (1999), "Morality Policy Reinvention: State Death Penalties", *Annals of the American Academy of Political and Social Sciences*, Vol. 566, pp. 80–92.

Morris, D. R. (1997), "Adrift in the Sea of Innovations: A Response to Alexander, Murphy and Woods", *Educational Researcher*, Vol. 26, pp. 22-6.

Mortimer, K. R. and T. R. McConnell (1982), *Sharing Authority Effectively*, Jossey-Bass, San Francisco.

Muilenburg, L.Y. and Z.L. Berge (2001), "Barriers to Distance Education: A Factor-analytic Study", *The American Journal of Distance Education*, Vol. 15, pp. 7-22.

Mulgan, G. and D. Albury (2003), *Innovation in the Public Sector*, Strategy Unit, Cabinet Office, October 2003, London.

Munch, J. (1996), "Continuing Vocational Training in the Countries of the European Union – Diversity of Functions and Special Problems", *European Journal Vocational Training*, Vol. 7, No. 1, pp. 3-8.

Natriello, G. (2005), "Modest Changes, Revolutionary Possibilities", *Teachers College Record*, Vol. 107, No. 8, pp. 1885-1904.

Newton, J. (2001), "Feeding the Beast or Improving Quality?: Academics' Perceptions of Quality Assurance and Quality Monitoring, *Quality in Higher Education*, Vol. 6, No. 2.

Observatory for Borderless Higher Education (2002), *Online Learning in Commonwealth Universities – Results from the Observatory 2002 Survey*, London.

OECD (2003), *New Challenges for Educational Research*, OECD Publishing, Paris.

OECD (2005), *Formative Assessment: Improving Learning in Secondary Classrooms*, OECD Publishing, Paris.

OECD (2007), *Evidence in Education: Linking Research and Policy*, OECD Publishing, Paris.

OECD and Eurostat. (2005), *Oslo Manual. Guidelines for Collecting and Interpreting Innovation Data*.

Olsen, F. (2001), "Survey Finds Another Increase in Campus Spending on Information Technology", *The Chronicle of Higher Education*, 4 April 2001, checked on 20/08/2008, *http://chronicle.com/free/2001/04/2001040401t.htm*.

Osborne, D. and T. Gaebler (1992), *Reinventing Government*, Addison-Wesley, Reading, MA.

Pajo, K. and C. Wallace (2001), "Barriers to the Uptake of Web-based Technology by University Teachers", *Journal of Distance Education*, Vol. 16, No. 1, pp. 70-84.

Papert, S. (1997), "Why School Reform is Impossible", *The Journal of the Learning Sciences*, Vol. 6, No. 4, pp. 417-27.

Patrinos, H. A. and S. Sosale (eds.) (2007), *Mobilizing the Private Sector for Public Education. A View from the Trenches*, The World Bank, Washington, D.C.

Polanyi, M. (1967), *The Tacit Dimension*, Routledge and Kegan Paul, London.

Presseisen, B. Z. (1985), *Unlearned Lessons*, Falmer, Basingstoke.

Ravitz, J. L. (1999), "Conditions that Facilitate Teacher Internet Use in Schools with High Internet Connectivity: A National Survey", *Dissertation Abstracts International*, Vol. 60, No. 4, 1094A.

Read, C. H. (1994), "Conditions that Facilitate the Use of Shared Decision Making in Schools", *Dissertation Abstracts International*, Vol. 55, No. 8, 2239A.

Reigeluth, C. and R. Garfinkle (1994), *Systemic Change in Education*, Educational Technology Publications, Englewood Cliffs, NJ.

Reigeluth, C., B. H. Banathy and J. R. Olson (1993), *Comprehensive System Design. A New Educational Technology*, Springer-Verlag, Berlin.

Robertson, T. S. (1971), *Innovative Behavior and Communication*, Reinhart and Winston, New York.

Rogers, E. M. (1995), *Diffusion of Innovations* (4th ed.), The Free Press, New York.

Russell, D. L. and A. Schneiderheinze (2005), "Understanding Innovation in Education Using Activity Theory", *Educational Technology and Society*, Vol. 8, No. 1, pp. 38 53.

Saint, W. (2006), "Innovation Funds for Higher Education: A Users' Guide for World Bank Funded Projects", *Education Working Paper Series*, No. 1, The World Bank, Washington.

Savedoff, W. D., R. Levine and N. Birdsall (2006), *When Will We Ever Learn? Improving Lives through Impact Evaluation*, Centre for Global Development, Washington, D.C.

Schmidt, P. (2001), "Weakening the Grip of Multicampus Boards", *Chronicle of Higher Education*, 23 March, p. A24.

Schumpeter, J.A. (1942), *Capitalism, Socialism and Democracy*, Harper and Row, New York.

Sellin, B. (2002), *Scenarios and Strategies for Vocational Education and Lifelong Learning in Europe. Summary of Findings and Conclusions of the Joint Cedefop/ETF Project (1998-2002)*, Office for Official Publications of the European Communities, Luxembourg.

Silva, K. (2008), "Guru of the Playgroup", *The Guardian*, Tuesday, 8 July.

Silver, H. (1999), "Managing to Innovate in Higher Education", *British Journal of Educational Studies*, Vol. 47, No. 2, pp. 145-56.

Simons, M. *et al.* (2003), *Implementing Innovative Approaches to Learning and Assessment through Training Packages*, NCVER, Adelaide.

Soule, S. A. (1999), "The Diffusion of an Unsuccessful Innovation", *Annals of the American Academy of Political and Social Science*, Vol. 566, pp. 120-31.

Souto-Otero, M. (2008), *OECD/CERI Literature Review on Innovation in Vocational Education and Training*, OECD, Paris (mimeo).

Souto-Otero, M., T. Fleckenstein and R. Dacombe (2008), "Filling in the Gaps: European Governance, the Open Method of Coordination and the European Commission", *Journal of Education Policy*, Vol. 23, No. 3, pp. 231-49.

Stasz, C. and S. Bodilly (2004), *Efforts to Improve the Quality of Vocational Education in Secondary Schools: Impact of Federal and State Policies*, The RAND Corporation, Santa Monica.

Stasz, C., and W.N. Grubb (1991), *Integrating Academic and Vocational Education: Guidelines for Assessing a Fuzzy Reform*, MDS-375, Berkeley, CA, National Center for Research in Vocational Education, University of California.

Stein, R. F. (1996), "Conditions that Facilitate the Implementation of Innovative Freshman Experience Courses: A Comparative Analysis of Three Courses", *Dissertation Abstracts International*, Vol. 58, No. 12, 4586A.

Sternberg, R., J. Pretz and J. Kaufman (2003), "Types of Innovation", in L. V. Shavinina (ed.), *The International Handbook on Innovation*, Pergamon, London, pp. 158-69.

Stockdill, S. H. and D. L. Morehouse (1992), "Critical Factors in the Successful Adoption of Technology: A Checklist Based on TDC Findings", *Educational Technology*, Vol. 1, pp. 57-58.

Szabo, M. and S. A. Sobon (2003), "A Case Study of Institutional Reform Based on Innovation Diffusion Theory through Instructional Technology", *Canadian Journal of Learning and Technology*, Vol. 29, No. 2.

Tearle, P. (2003). "ICT Implementation: What Makes the Difference?", *British Journal of Educational Technology*, Vol. 34, No 5, pp. 567-83.

UNFPA. (2004, March), *Programme Manager's Planning Monitoring & Evaluation Toolkit*, retrieved from *www.unfpa.org/monitoring/toolkit/tool1_glossary.pdf.*

US Advisory Committee on Measuring Innovation (2008), *Innovation Measurement. Tracking the State of Innovation in the American Economy*, US Advisory Committee on Measuring Innovation, Washington, D.C.

US Department of Education (1999), *Teacher Quality: A Report on the Preparation and Qualifications of Public School Teachers*, US Department of Education, Washington, D.C.

-(1996) *A test of Leadership: charting the future of U.S. Higher Education*, US Department of Education, Washington, D.C.

Uys, P. M., P. Nleya and G. B. Molelu (2004), "Technological Innovation and Management Strategies for Higher Education in Africa: Harmonizing Reality and Idealism", *Educational Media International*, Vol. 41, No. 1, pp. 67-80.

Walker, J. L. (1969), "The Diffusion of Innovations Among the American States", *American Political Science Review*, Vol. 63, No. 3, pp. 880–99.

Williams, A. (1999), *Creativity, Invention and Innovation*, Allen and Unwin, Sydney.

Wong, K. K. and F. X. Shen (2002), "Politics of State-led Reform in Education: Market Competition and Electoral Dynamics", *Educational Policy*, Vol. 16, No. 1, pp. 161-92.

Wong, E. M. L. *et al.* (2008), "Insights into Innovative Classroom Practices with ICT: Identifying the Impetus for Change", *Educational Technology & Society*, Vol. 11, No. 1, pp. 248-65.

Zack, M. H. (1999), Managing Codified Knowledge, *Sloan Management Review*, Vol. 40, No. 4, pp. 45-58.

Zalman, G. and R. Duncan (1977), *Strategies for Planned Change*, John Wiley and Sons, New York.

Zaltman, G., R. Duncan and J. Holbek (1973), *Innovations and Organizations*, John Wiley, New York.