# WHAT CAN WE LEARN FROM OTHER DISCIPLINES ABOUT THE SUSTAINABLE IMPACT OF PROFESSIONAL DEVELOPMENT PROGRAMMES?

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*This paper deals with the sustainable impact of professional development programmes. While research on this issue is rather scarce in mathematics teacher education, some other domains like health care or development aid are well grounded in research results regarding this topic. This paper gives an insight into the other disciplines' knowledge concerning the impact of innovations and professional development programmes and the respective fostering factors. Moreover, possible implications for mathematics teacher education are discussed.*

## INTRODUCTION

The question of how to promote mathematics teachers' professional development is of great interest and discussed in various papers (e.g., Krainer & Zehetmeier, 2008; Loucks-Horsley, Stiles, & Hewson, 1996; Maldonado, 2002; Sowder, 2007; Zehetmeier, 2010; Zehetmeier & Krainer, 2011). In this context, the question of sustainability is of particular relevance. Despite its central importance for both, teachers and teacher educators, research on sustainable impact is generally lacking within teacher education disciplines (Datnow, 2006; Rogers, 2003).

However, a sound knowledge base concerning the issue of sustainability would be useful for understanding the long-term impact of teacher professional development programmes. At the same time, this knowledge would allow thorough discussions regarding implications for upcoming professional development programmes' planning, implementation, and evaluation. The aim of this paper is to provide other disciplines' knowledge concerning this issue. For this, an extensive literature was carried out; using qualitative content analysis (Mayring, 2003), relevant topics were identified and clustered. The following sections provide other disciplines' knowledge regarding factors that foster the sustainability of professional development programmes' impact.

This raises the question: Who are the others? Health care disciplines come with a relative long tradition of researching the topic of professional development's sustainable impact. This led to a widespread body of research findings concerning this issue. Besides the health care disciplines also research on development aid or public service evaluation has available interesting findings; they also can be used as focal points for discussing and reflecting sustainability in mathematics teacher education. Thus, this paper's literature review is based particularly on research findings from health care disciplines (e.g., Scheirer, 2005). Moreover, results from

disciplines like development aid (e.g., van den Berg, 2006) or public service evaluation (e.g., Savaya, Elsworth, & Rogers, 2009) are provided.

## THE OTHERS' FOSTERING FACTORS

Literature regarding conceptual or empirical knowledge of factors that may foster the sustainability of innovations is rather sparse (Johnson et al., 2004). However, "the question of what factors contribute to or detract from program sustainability is important because … it cannot be assumed that proven success in achieving its goals ensures a program's continuation beyond its initial funding" (Savaya et al., 2009, p. 2). The question which factors help increase the likelihood of sustainability is particularly addressed in literature regarding the institutionalization of programmes within organizations: "This issue is of central importance when one is planning for program sustainability, when it is helpful to know what processes and other influences need to be considered to extend the delivery of program activities" (Scheirer, 2005, p. 324).

This paper uses a qualitative analysis of literature (Mayring, 2003): Eight central factors, which foster the sustainability of programmes, were categorized. The following factors are central, because they were found to be influential more often than other ones: perceived benefit, innovation champions, mutual fitting, institutional support, sufficient resources, networking, ownership, and integration of rules. The following paragraphs provide an overview concerning these central factors.

### Perceived benefit

One of the central factors fostering the sustainability of programmes is "the perceived benefit from the programme" (Amazigo et al., 2007, p. 2080) for the people involved. This implies in particular that "attention to the needs, attitudes, and perceptions of adopters is critical to their sustained use of an innovation" (Johnson et al., 2004, p. 143). And further: "Users must perceive a benefit to the innovation beyond that of current practices. … Adopters are also more likely to sustain an innovation if they believe it is effective" (Johnson et al., 2004, p. 145). Baum et al. (2006) state that some "initiatives were often only felt to have happened because of the previous collaborations. ... In effect these had laid the seed bed on which future projects grew" (p. 262).

In particular, the "evidence that the model works … and the ability to document positive client outcomes" (Blasinsky et al., 2006, p. 721) represents a strong fostering factor. On the other hand, Scheirer (2005) highlights that these "benefits to staff members and/or clients … are readily perceived, but not necessarily documented via formal evaluation" (p. 339). This issue points to benefits and outcomes which may not have been intended or expected in a programme's conception; and which may – thus – not be considered in project evaluations or research efforts.

Pluye, Potvin, Denis, Pelletier, and Mannoni (2005) found incentives to be a factor fostering the sustainability of innovations: "The promotion of personnel (into positions of greater responsibility and power) encouraged the routinization of innovations. … Adding concrete benefits to human resources also constitutes an incentive (for example, in the form of convenience or reduced effort)" (p. 125).

**Innovation champions**

Another central factor that supports the sustainability of programmes is "the presence of champions for an innovation" (Johnson et al., 2004, p. 138). Similarly, Scheirer (2005) highlights "the key role of a program champion" (p. 339). Also Savaya et al. (2009) state that "program champions who promote the program in the organization and the community can contribute to program sustainability" (p. 2).

These champions are "formal and informal leaders within adopting systems … who proactively promote an innovation from inside or outside of a system" (Johnson et al., 2004, p. 143). They "are critical to creating an environment that supports and facilitates sustaining innovations. … Such champions can serve as brokers on behalf of the innovation with other decisionmakers" (Johnson et al., 2004). Johnson et al. (2004) describe in detail: "Essential skills for innovation champions include communicating their commitment to the innovation, … engaging others, overcoming barriers, building infrastructure, thinking and learning reflectively, summarizing and communicating, coaching for sustainability, and building further organizational capacity to spread the innovation" (p. 144).

Blasinsky et al. (2006) point to the importance of staff members who are "already trained [in the programme]" and are "available not only to continue [the programme] but also to train others in the intervention" (p. 726).

**Mutual fitting**

Yet another central factor fostering sustainability is the fitting of innovations and adopting institutions. For example, "when program objectives fit with the values of the organization and staff" (Pluye et al., 2005, p. 125). Or "when cultural artifacts from program activities are shared with organizational artifacts" (Pluye et al., 2005, p. 125); here, artifacts are defined as myths, symbols, metaphors and rituals that express a set of organizational values, beliefs and feelings. Another kind of fitting is represented by "the adaptation of activities according to their context or environment" (Pluye et al., 2005); in this case, adaptation means the adjustment of activities regarding local contexts and environmental variations. In sum, this refers to introducing innovations into organisations without "disruption of the operating work flow" (p. 126).

Johnson et al. (2004) state that sustainability is fostered when innovative programmes are "compatible with the philosophical orientation … and internal agenda of users" (p. 145). Similarly, Scheirer (2005) claims for "a substantial fit with the underlying organization's mission and procedures" (p. 339). This challenges both

the organisations' stability and flexibility: "The stability of an organization and its ability to change significantly contribute to the sustainability of new programs" (Savaya et al., 2009, p. 2).

**Institutional support**

Institutional support is another central factor that supports the sustainability of programmes. This can be mirrored by the "willingness of the organization to promote change" (Blasinsky et al., 2006, p. 726). Or when organisations take the risk of supporting innovative programme activities: Because then organisations "build confidence among actors involved in activities and encourage the routinization of programs" (Pluye et al., 2005, p. 124).

For this, the administration of organisations "must have the structures and capacity necessary to carry out administrative functions related to an innovation responsively, effectively, and efficiently" (Johnson et al., 2004, p. 144). In this regard, it is important to know that "systems that focus on strengthening administrative capacity to support an innovation during its initial implementation are more successful at sustaining the innovation once the initial trial ends" (Johnson et al., 2004, p. 144).

**Sufficient resources**

Yet another central factor fostering sustainability is the availability of resources. Johnson et al. (2004) state that "sustainability research clearly identifies resources as important to sustaining innovations" (p. 143). These resources include human, physical, technological, financial and informational resources (Pluye et al., 2005; Johnson et al., 2004). Sufficient resources can support the sustainability of programmes in the case of "equipment turnover (renewal of material resources when needed)" or of "turnover in key personnel (change of original personnel after an appropriate period of time)" (Pluye et al., 2005, p. 124). To ensure the availability of sufficient resources, programmes can "have multiple sources of funding", and/or "the project leaders can plan to raise resources for the future, when fund raising starts early on" (Savaya et al., 2009, p. 2).

**Networking**

Savaya et al. (2009) highlight the importance of networking: "Self-contained programs are less likely to be sustained than are programs that are well integrated with existing systems" (p. 2). In this regard, Pluye et al. (2005) state "that transparent communication between the actors is necessary to achieve congruence among objectives, to share cultural artifacts, and to take corrective actions, thus promoting routinization" (p. 125). For networking, some "positive relationships among key implementers" (Johnson et al., 2004, p. 138) are useful: "Collaboration between program developers and teachers who are implementing the program appeared to increase their commitment and desire to implement the new procedures. A supportive peer network among implementers of an innovation is also important for sustaining innovations" (Johnson et al., 2004, p. 138).

### Ownership

Savaya et al. (2009) point to the factor ownership as being central for sustainability: They found "greater sustainability of programs that were developed and implemented with the involvement and support of community bodies" (p. 2). Also Johnson et al. (2004) indicate the importance of "ownership by … system stakeholders" (p. 138) as factor fostering the sustainability of innovative programmes. Similarly, Amazigo et al. (2007) point to the fostering influence of "community leaders [who] show appreciation" (p. 2080) for the programmes.

### Integration of rules

Research findings of Johnson et al. (2004) suggest that the integration of rules is another fostering factor: "Policies and procedures … assure that the innovation remains part of the routine practice of the organization, even after the top management who advocated sustaining the innovation leaves the organization" (p. 143). For Yin (1981), sustainability is fostered when "program functions become part of job descriptions and prerequisites" or when "the use of innovation becomes part of statute, regulation, manual, etc." (p. 63).

## DISCUSSION AND IMPLICATIONS

This section links the others' fostering factors to mathematics teacher education. Communalities can indicate possible affirmations and validations of our discipline's knowledge. Differences may point to aspects worth being challenged and reconsidered.

### Communalities

The other disciplines identified several factors that foster the sustainability of programmes (see the others' factors above). In a meta-analysis concerning factors in the teacher education disciplines, Zehetmeier (2008) found yet similar, but not the same factors. For example, mutual fitting, ownership, and networking turned out to be central fostering factors in both the others' and teacher education literature. Therefore, it seems reasonable to facilitate factors identified by both domains.

Zehetmeier and Krainer (2011) highlight in particular the outstanding relevance of contextual factors. Similarly, a study of Nickerson and Moriarty (2005) points to organizational conditions (e.g., teachers' relationships with the school administration) being highly relevant for the further development of schools. Since contextual factors contribute particularly to sustainable impact, organisational development should be part of any professional development programme. This means, that not only mathematics teachers should be seen as a programme's target group, but also the teachers' contexts (e.g., colleagues, pupils, principals, parents, policies, etc…). Therefore, professional development and school development should be considered as concomitant processes. This relevance of contextual factors

is also highlighted in the other disciplines (see section “institutional support”, above).

Rogers (2003) highlights that the diffusion of an innovation depends on different characteristics: Relative advantage, compatibility, complexity, trialability, and observability. Fullan (2001) describes similar characteristics (need, clarity, complexity, quality, and practicality) influencing the acceptance and impact of innovations. Relative Advantage includes the perceived advantage of the innovation (which is not necessarily the same as the objective one). Compatibility and need denote the degree to which the innovation is perceived by the adopters as consistent with their needs, values and experiences. Complexity and clarity include teachers’ perception of how difficult the innovation is to be understood or used. Trialability denotes the opportunity of participating teachers to experiment and test the innovation (at least on a limited basis). Quality and practicality make an impact on the change process. Observability points to the claim that innovations should be visible to other stakeholders. Therefore, when aiming at sustainable impact, the following implications should be considered: An innovation with greater relative advantage will be adopted more rapidly. This issue is also addressed by the other disciplines’ factor “perceived benefit” (see above). More complex innovations are adopted rather slowly, compared to less complicated ones. Innovations that can be tested in small steps represent less uncertainty and will be adopted as a whole more rapidly. High quality innovations that are easily applicable in practice are more rapidly accepted. Innovations which are visible to other persons and organisations are more likely to be rapidly accepted and adopted. These implications are closely linked to the others’ fostering factor “integrations of rules” (see above).

Shediac-Rizkallah and Bone (1998) categorized three groups of factors that foster or hamper programmes’ sustainability: (a) factors pertaining to the project; (b) factors within the organizational setting, and (c) factors in the broader community environment. Zehetmeier and Krainer (2011) try to reduce the multiple factors’ complexity by clustering them into three dimensions (the three Cs; see Krainer, 2006): Content (high level and balance of subject-related action and reflection), Community (high level and balance of individual and social activities, in particular fostering community-building within and outside the professional development programme), and Context (high level and balance of internal and external support). Thus, both domains acknowledge the rather complex system of factors and try to establish useful and suitable models. Therefore, if professional development programmes are aimed to be sustainable, it seems crucial to carefully consider and facilitate these fostering factors. If some of these factors are dependent from the programmes’ existence, then these factors may be substituted with alternative ones that are less or not at all connected to the programmes’ existence.

## Differences

Leadership as fostering factor is not really a topic in the others' disciplines. Indeed, Johnson et al. (2004) point to "effective leadership" (p. 138) being a fostering factor. However, it remains unclear, what this notion may mean. By contrast, within the teacher education disciplines the issue of leadership is of great importance. The results of several studies suggest the central influence of school leadership to the (sustainable) impact of school innovation initiatives (e.g., Fullan, 2006; Owston, 2007): Fullan (2006) proposes a direct correlation between the sustainability of innovations a the new role of school leadership: "This new leadership, if enduring, large scale change is desired, needs to go beyond the successes of increasing student achievement and move toward leading organizations to sustainability"(p. 113). These new leaders focus on systemic relationships to foster sustainability not only on the individual level, but also on the levels of organisations or educational systems. "Such leaders widen their sphere of engagement by interacting with other schools in a process we call lateral capacity building. When several leaders act this way they actually change the context in which they work" (Fullan, 2006, p. 113). Fullan (2006) calls this new type of leadership "system thinkers in action" ("they have the capacity to be simultaneously on the dance floor and the balcony", p. 114). Similarly, Owston (2007) states: "Support from the school principal is another essential factor that contributes to sustainability" (p. 70). He distinguishes three types of administrative support: Neutral leaders (who meet innovations rather passive without promoting or prohibiting); Supportive principals (who create and support beneficial environments for innovations); And actively involved leaders (who are driving visionary ideas, identify personally with innovations and motivate other teachers for the innovation). Therefore, for programmes aiming at sustainable impact, it seems indicated to foster and support this kind of leadership.

The presence of an innovation champion as fostering factor is rather no big topic in mathematics teacher education. However, Cobb and Smith (2008) highlight the important role of "brokers" (as do Johnson et al., 2004, see above) for the development of a shared instructional vision of high quality mathematics instruction. They describe brokers as people "who can facilitate the development of a shared instructional vision by bridging between perspectives and agendas of different role groups. Brokers are people who participate at least peripherally in the activities of two or more groups, and thus have access to the perspectives and meanings of each group" (p. 238).

## SUMMARY

This literature review revealed other disciplines' knowledge regarding the sustainability of professional development programmes' impact. With regard to mathematics teacher education the following implications can be deduced: Teachers, facilitators, and researchers of professional development programmes should

- plan for sustainability from the very start,
- take systematically into account the unintended and unexpected impacts,
- consider professional development and school development as concomitant processes,
- foster and support sustainable leadership,
- foster and support innovation champions,
- focus on factors that are less dependent from the programme's existence.

When discussing and researching professional development programmes' sustainable impact, the fostering factors are playing the central role. Knowing and being sensible for them is prerequisite for any conceptualization, implementation and evaluation of future professional development programmes which aim at sustainable impact. Thus, further, broader as well as deeper research of professional development programmes' sustainable impact and their respective fostering factors appears to be promising from both scientific and practical perspectives.

Another felicitous sentence concerning the complexity of fostering and hindering factors is provided by Slavin (2004): "With the many ways that innovations can be undone, it is perhaps more surprising when they do maintain over time than when they do not" (p. 61). Therefore, each programme has to carefully consider its respective fostering factors regarding the sustainability of impact, since each professional development programme has its own and particular objectives, contents, methods, and environments. Considering these factors in the programme's planning may help to establish sustainable impact.

## NOTE

This paper is a modified and shortened version of Zehetmeier (in press). In this aforesaid paper, also the others' rationales, definitions, theories, research methods, and discussions are provided.

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