CONSTRAINTS TO AND OPPORTUNITIES FOR ICT-SUPPORTED PROFESSIONAL DEVELOPMENT IN AFRICA: THE CASE OF BIOLOGY TEACHERS IN BOTSWANA.

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Summary

The use of Information and Communications Technologies (ICTs) is known to provide opportunities for formal professional development courses to be extended and integrated into workplace activities and operations leading to continuous learning. However, there are challenges and issues surrounding the use of ICTs for workplace-based learning (WBL) particularly in resource-challenged contexts like Africa. The nature of these problems is complex, encompassing both local dynamics and issues that are common across different contexts. This paper, therefore, gives an account of a project that was meant to utilise the opportunities of combining formal in-service training (INSET) and WBL with a number of Biology teachers in Botswana using online means. A socio-technical space called Biology Teachers Online (BTO) was designed to facilitate an online community of practice amongst the teachers who had attended an INSET workshop together so that they could continue to interact and benefit from both situated and distributed learning in their respective schools. This paper, in particular, analyses the constraints, the local dynamics and systemic factors that existed in the implementation environment of this project. The paper concludes by suggesting some systemic adjustments that may be necessary to expand existing opportunities for flexible and lifelong learning for teachers.

Introduction

The use of Information and Communications Technologies (ICTs) is known to provide opportunities for formal professional development courses to be extended and integrated into workplace activities and operations leading to continuous learning (Wenger, 1998; Lave & Wenger, 1991; Engëstrom, 2001). For example, Collis and Margaryan (2004) used the approach in a corporate setting where the instruction they designed was characterised by computer-supported collaborative learning and work-based activities in a multi-national corporation thus integrating the strengths of formal and informal learning. This approach, they contend, is an expansion of social and intellectual involvement, over time, with other people and the tools available in their work culture.

In the context of teacher in-service training (INSET) or teacher professional development (TPD) a similar trend has been observed. There has been a move from the traditional view of INSET which depended on direct teaching methods such as workshops towards more participatory methods (Hargreaves & Fullan, 1992). The metaphor used to describe this model of TPD is “ecological change” and it places a high recognition on the influence that the context within which teachers work determines the success of training. Ecological change, as a TPD approach, views learning as an integral part of the workplace community of practice and activity(Hargreaves and Fullan, 1992; Hodkinson & Hodkinson; Hargreaves, 1992;

Lieberman, 1995; Clement & Vandernberghe, 2001; Wenger, 1998). Thus, it is concluded that TPD that brings real change to teachers' work and school improvement is one which is continuous, collaborative and situated in real practice. This conclusion does not, in anyway, belittle the importance and effectiveness of workshops; it rather advocates for teachers to have opportunities to implement the skills acquired in these workshops within workplace environments that are intellectually, professionally, socially and physically supportive in nature.

The conditions for effective TPD as outlined above can be fostered by ICTs, particularly the notion of online communities of practice (Carr & Chambers, 2006). An online community of practice is essentially a group of people, with some common professional identity, who come together in an online environment to collaborate towards a common purpose. Online communities of practice afford teachers an opportunity to participate in collaborative, continuous and situated learning activities while benefiting from spatially distributed cognition thus reducing the impact of reducing teacher isolation and promoting sharing and reflective practice (Bannet, 2002). Online communities of practice have therefore proved successful in workplace based and have, in fact, become a common model for effective TPD.

However, this model is not without challenges. The factors reported in the literature as influencing the success of ICTs, particularly online communities of practice, can be categorized broadly into institutional/contextual factors and personal/teacher factors. Under the former category are included factors that are workplace-related such as the availability of physical resources and the socio-cultural dynamics of the concerned institution (Mumtaz, 2000; Blumenfeld et al., 2001; Carr and Chambers, 2006a, 2006b; Kwakman, 2003; Glazer & Hanaffin, 2006).The latter category, that is personal or teacher level factors, are concerned with teachers' affects, beliefs, values, teacher attitudes/dispositions and personal ICT skills (Glazer & Hannafin, 2006; Mumtaz, 2000). For example, if teachers are not motivated or are resistant to the use of technology in their work or learning endevours, it will negatively affect their participation in the activities of an online community.

Having made the above review, it is important to observe that there is still limited literature concerning the use of ICTs for workplace-based teacher learning particularly online communities of practice for TPD purposes in developing contexts such as Africa. Hence there is a paucity of understanding of the actual nature and extent of the challenges of this model of training in such contexts which are resource-challenged and culturally different from the West. To contribute to such understanding, this paper gives an account of a project that was meant to utilise the opportunities of combining formal in-service training (INSET) and WBL with a number of Biology teachers in Botswana using online means.

Project description[1]

Context

The specific context of the study is an in-service training (INSET) programme run by the Department of Mathematics and Science education (DMSE) at the University of Botswana (UB). This programme which targets senior secondary school mathematics and science teachers is run through face-to-face workshops on behalf of the Ministry of Education. While these teachers appreciate the course activities during the INSET workshops and the relevance of the content, it had been observed that they '…would, however, like to be provided with more concrete and specific guidelines on how to implement course issues in the actual classroom situation with all its constraints' (Thijs, 1999, p. 48). This guidance to teachers is limited or not available at all once they get back to their schools and they fail to successfully implement their skills. Some of the reasons for this are that:

- Only one or two teachers usually go for the training on behalf of the rest of the school and as such sharing with others becomes a challenge either because the teacher does not feel confident enough or the intended recipients may not be interested.

[1] This project formed a big part of the author's PhD study (Boitshwarelo, 2007a)

- Additionally, there is also a geographical separation between participants of the same workshop, once they are back in their respective schools and therefore very little interaction, if any, happens between them over workshop outcomes and how they are implementing them in their schools. In some regions, which are sparsely populated senior secondary schools which are in closest proximity to each other may still be over a 100 or 200 kilometres apart.

- The visits by DMSE-INSET staff members, who are few in number, may not be enough since they normally can only visit schools once per implementation phase, if at all. Because the secondary schools are spread out across the country it becomes difficult to visit them all. Travelling across to all the schools could mean a road trip of well over a thousand kilometres.

Given this situation, an online environment was conceptualized to span the identified isolation through extending the interaction between the teachers, Biology teachers in this instance, even after the workshop when they are in their workplaces.

Aim

While this was a developmental project, its research intention was to investigate the potential of online learning environments in facilitating collaboration among biology teachers in their specific workplaces with peers elsewhere. In particular, the research was concerned with investigating the minefield of contextual factors and dynamics surrounding the implementation process of the online environment and how they shaped its outcome.

Methods

Informed by principles from the literature on current practices, an online intervention called Biology Teachers Online (BTO) was developed in WebCT at the UB for the purpose of facilitating a community of practice among the biology teachers and their trainers at DMSE-INSET with the researcher (author) as a participant observer. Ten teachers and one trainer, volunteered to participate by way of using BTO to collaborate on the development and implementation of worksheets for teaching "Process skills in the Biology syllabus". From the survey conducted at the workshop and during school visits only two out of the ten schools represented by the teacher participants were connected to the Internet (which was necessary for participation in this project). The two participants from these schools had undertaken to use Internet cafés, although one of the participants would have to drive about 50km to the capital city to access Internet.

This project ran for a period of 3 months during which participants were expected to collaboratively refine the worksheets for teaching process skills which they had started developing at the workshop. The intention was to get feedback from peers in schools as they implemented the draft worksheets with their students and use this feedback to discuss with the online community. Basically BTO was meant to get the group to '…construct knowledge, that no one individual could have constructed alone, by a synergistic effect that merges ideas from different individual perspectives' (Stahl, 2005, p. 82).

Findings

The findings of this research project are reported against the background that the participation in BTO discussion forum was very low with only a total of 9 accesses and a total of 4 posted messages from teacher participants. These findings therefore identify and describe key influences and issues that seemed to shape the BTO enactment process. The findings are described under the following categories.

The Biology teachers

The ten Biology teachers who participated had been teachers for a period ranging from less than one year to five years. Most of them had participated in at least one INSET activity but none of them had had prior experience with ICT-supported INSET. However, they all indicated that they were looking forward to participating in the online forum and that they

appreciated the value of this intervention into their usual traditional INSET. However, this interest or motivation did not translate into participation and the reasons advanced were: discouragement due to the lack of time to access BTO; disappointment at the lack of participation by colleagues in BTO and; a very limited access to the Internet in their respective schools..There was an issue of adequate skills with some participants reporting that they were having problems accessing the BTO environment. For example, one participant had a problem related to "pop up windows" and they could not deal with it nor did they ask for help from colleagues or technical staff in the school. From interviews and questionnaires conducted the biggest barrier to participation appeared to have been the lack of adequate convenient access to the Internet by teachers in their respective locations. The access situation originated not just from the few Internet connections, but also the times at which access was available to the teachers, the quality of the connectivity and the competition for access with other colleagues in the school. For example, one participant mentioned: "I am still trying to get access. *Sometimes Internet is very slow*. We are only given an hour [per week] which in most cases is not enough" [*emphasis added*]. These barriers to participation prompted an investigation of the school environment particularly the ICT situation. The next category describes the findings on the school environment.

The school environment[2]

While the teachers involved seemed to have a positive disposition towards the intervention, the process of enactment was limited by their lack of involvement. This lack of involvement by teachers above seemed to be explained largely by the non-enabling school ICT environment as described below:

- The schools represented had a computer laboratory with at least 20 computers as it is generally the case with all government secondary schools in Botswana. In most schools there would be additional computers in the school administration building and in some teaching departments.
- Eight out of the ten schools surveyed were connected to the Internet with the other 2 expecting to connect soon. These were connected through private Internet Service Providers (ISPs) which mostly provide narrow bandwidth Internet.
- Number of computers connected to the Internet in the 8 schools ranged from 1-6 computers and these were mostly centralised to computer laboratories.
- The reason for connecting the Internet in these schools varied and were reported as follows*:*
    - Access to educational materials and resources
    - Finding information and doing research on subject matter by teachers for their lessons.
    - Communication with various bodies and sending and receiving materials to and from other institutions.
    - For teaching computer studies and computer awareness (Internet is part of the syllabus for these 2 subjects.
    - With regard to its potential use in teacher professional development, accessing of resources and materials by teachers on their subjects was the dominant view.

- *The computer laboratories in the schools are used primarily for teaching* Computer Studies and therefore they usually can only be accessed by teachers when there are no classes running which is mostly in the afternoons. In some instances this is limited to only one day a week and has to be booked in advance in a situation where there is more than 100 teachers in each secondary schools.

This situation that is obtaining in schools is not just a result of the local dynamics at the school level, but it also is also an indication of the policy environment within the education

[2] An in-depth analysis of the school ICT-environment in relation to TPD is reported elsewhere (Boitshwarelo, 2007b)

system and at the national level. Thus, the following category describes some aspects of the policy environment that shape the ICT environment in schools.

The policy environment

In exploring the policy environment the research identified two policy documents that were of utmost importance with regard to the schools' ICT environment namely the Revised National Policy on Education (RNPE) of 1994 and the Draft National ICT Policy[3] which was approved at the end of 2007(Republic of Botswana, 1994; Ministry of Communication Science and Technology, 2005).). With regard to ICT in secondary schools, the RNPE highlights three areas:

- Computers awareness and computer studies for students;
- Computer literacy for all teachers;
- Enough computers to enable students to develop computer skills and;
- The idea of using technology to teach technology

On the other hand, the National ICT Policy places emphasis on increasing access to ICT facilities through connectivity in schools and other social places. In addition, the policy recommends the Professional Development Programme for Teachers. This programme proposes ICT training of teachers beginning with headmasters and school ICT managers. Ultimately, the idea is that teachers would be given skills in the integration of ICT into all aspects of the curriculum. While this programme recognises ICT education as a "subject" in its own right and as a tool for teaching, it does not emphasise ICT as a tool through which teachers themselves can acquire other skills. Thus, there seems to be emphasis on "teacher ICT education" rather than "ICT for teacher education".

The RNPE and the National ICT policy documents recognise the importance of ICT in the school curriculum and recommends adequate facilities in schools so that students can acquire ICT skills. While the policies recognise the importance of teachers acquiring ICT skills, less emphasis seem to be placed on the role of ICT as a tools for ongoing, interactive and participatory TPD.

Other influences

There were other influences which are beyond the scope of this paper which also shaped the process and outcome of BTO. These included issues related to the training environment or provider which is the DMSE-INSET at the UB as well as the quality of Internet provision by private ISPs

Discussion and conclusions

The findings reveal the complexity of enacting ICT-supported TPD in Botswana in terms of the individual, organizational and systemic levels of influence. These levels connect intricately and reciprocally to create affordances and constraints. The teachers involved in this study seemed to be motivated towards participation as evidenced by the fact that they volunteered and indicated interest in the online intervention, BTO. Motivation whether, is a necessary precursor to participation in innovative learning experiences. Therefore, this motivation provided an aptitude or readiness for participation thus an opportunity towards ICT-supported learning. However, the issue of limited ICT-skills as well as the lack of experience and confidence with online learning environments on the part of the teachers was a constraint which led to negligible participation. This negligible participation by these apparently-motivated teachers led discouraged others who came expecting activity. In other words, there was failure to create a critical mass of dialogue within the environment to sustain the process of interaction.

[3] At the time of the study (2006/2007) this Policy had not been fully approved but some elements of it were been implemented in anticipation

Beyond these factors that relate to teachers themselves, there was the organizational issue related to lack of adequate ICT facilities particularly the Internet. However, the fact that schools have ICT facilities, however meager, should be seen as an opportunity that can be harnessed. For example, the same facilities in schools could be managed more prudently to widen access to teachers even beyond just teaching activities. One way of doing this could be through decentralizing Internet provision from just the computer laboratories to other places such as departmental rooms and extending hours of access to include after-work hours. Such approach to management of ICT facilities will emanate from the realization that these technologies are tools for lifelong learning and an understanding that learning opportunities for teachers should be created across space and time. This requires a change in beliefs from a centralized transmission view of training (which is still dominant in the Botswana context and probably in the rest of Africa) to more open and participatory approaches.

These organizational level dynamics do not operate insular but are largely a reflection and realization of policy both at the sectoral and national level. The findings of this study revealed a certain emphasis on policy documents which omitted crucial elements that are necessary for teachers to use ICTs for lifelong pursuits in workplace contexts. This, in turn, has cascaded to schools.

In conclusion, the paper recognizes that there is a gross shortage of ICT-resources in African contexts like Botswana so that ICT-supported training in the workplace is not possible on a large scale. It further observes that, more than the shortage of resources, there are other issues that constrain such initiatives: lack of ICT skills on the part of the teachers, non-enabling school environments both culturally and facility-wise, systemic constraints that are perpetrated through policy omissions. Despite this, the paper suggests that opportunities can be created through optimization of resource utilization and a culture that intentionally supports teacher learning at the school level. On the policy front, there is a need for a shift towards more participatory and localized methods of INSET. Concomitant with this shift, there should be a provision of ICT-facilities that are primarily for use by teachers in their work and TPD pursuits.

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