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What impact does a change-agent have on faculty use of technology?

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This study was undertaken to examine the influence that a set of Professional Development (PD) initiatives had on faculty use of Moodle, a well-known Course Management System. The context of the study was a private university in Japan that specializes in languages. Specifically, it aimed to identify the way in which the PD initiatives adhered to professional development best practice criteria, and what impact the PD initiatives had on faculty use of Moodle. The study utilized a mixed-methods approach. Participants in the study were 42 teachers who worked at the university. The results indicated that the PD initiatives adhered closely to criteria posited in technology-related professional development best practice criteria. Further, results from the online survey and follow up face-to-face interviews indicated that while the PD initiatives that were implemented were positively perceived by faculty, they did not have the anticipated impact on Moodle use.

Keywords: Teacher education, Moodle, in-service training, teacher change, perceptions of technology

Introduction

The context of this study was a private university in Japan that specializes in languages. The university has used the Moodle CMS since 2003 to assist in various language related classes such as Academic Writing, Intensive Reading, Extensive Reading, Freshman English, Communicative Grammar, and various content based classes for 3rd and 4th year students. An ongoing financial commitment has been made to include Moodle as an important part of the educational landscape within the university,

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and it is hoped that Moodle is used at an individual and departmental level. Each year in late March, during training and orientation for new teachers, a one day Moodle orientation is provided. During that presentation, teachers are taught how to login to Moodle and to create their own classes and add content. However, it was deemed insufficient by both the trainers and the new teachers, not least of all because one day cannot show teachers the various uses of Moodle, or the many practical ways in which Moodle may be relevant for individual faculty members teaching a variety of classes.

Therefore, the supervisor of the university's technology committee was given the mission of implementing a thorough professional development (PD) program that could show faculty not only how to use Moodle and all its features, but also why they would use it and how it could benefit them in the short term and long term paths of their teaching careers. The members of the technology committee were all experienced users of Moodle, and were required to use Moodle in their classes. There were five members in total, positioned in different buildings deliberately to ensure that teachers in different buildings had access to Moodle support staff. In addition, one of the requirements of the PD program was to ensure that teachers learning about Moodle could access the PD initiatives both on campus and off campus whenever they needed to.

In part, professional development (PD) is designed to improve teaching practice and provide fresh impetus on ways to bridge the divide between theory, pedagogy, and practice. Although PD initiatives are not directed primarily at students, they are its final beneficiaries (Bliss & Bliss, 2003), and an impact on classroom practice is typically the ultimate intended outcome of PD (Harland & Kinder, 1997). However, the most effective way to deliver PD in an educational setting is still open to debate, particularly in regards to PD and technology in education. One way that technology-related PD is commonly delivered is through in-service training. Therefore, in that context there needs to be someone within an organization who understands effective PD, and the techniques necessary to deliver it.

That is where a change-agent becomes relevant. According to Pathak (2010), a change-agent is defined as a person who acts as a catalyst and assumes the responsibility for managing change activities in an organization, and works for the accomplishment of the goals or objectives of the organization. Indeed, according to Everett Rogers' "Diffusion of Innovations" model (2003), the "extent of a change-agent's promotion efforts" is one of the five most influential variables in terms of changing the habits of technology use among members of an organization.

One of the main ways a change-agent can engender such change is through an effective PD program. But what does effective mean? And in the context of this study, what does effective technology-related PD mean? These questions are necessary because it is impossible to measure the efficacy of a program for change on its target audience, or the impact of the change-agent, without first examining the elements of the program itself.

Therefore, this study examines the professional development program that was implemented by the change-agent at the university. Specifically, it will determine whether or not the PD initiatives that were implemented adhered to best practice criteria posited in the literature, and then analyze the impact the PD initiatives had on the use of Moodle among faculty.

The theoretical model used is Everett Rogers' Diffusion of Innovations model. This model is a seminal work in diffusion theory with regards to technology use in organizations. According to Rogers' model, a change-agent is among the five most important facets of increasing the use of a form of technology within an organization.

Literature review

Rogers' (2003) Diffusion of Innovations (DOI) model states that there are five main variables which most influence the use of an innovation in an organization, one of which is the *Extent of the Change-agent's Promotion Efforts*. This means that a change-agent who is employed to facilitate technology-related change is reported to be one of the most important elements in successfully engendering change among its users. According to Rogers (2003), a change-agent seeks to shift clients – in this case teachers – away from a position of reliance on the change-agent, to one of self-reliance. One of the most common ways a change-agent can do this in the context of education, including English Language Teaching (ELT), is by way of teacher education, or a specifically designed Professional Development (PD) program.

In order to do that, research (Ensminger & Surry, 2008; Hall & Hord, 1987; Rogers, 2003) indicates that when a technology-related PD program is implemented, the change-agent should adhere to a number of essential criteria. For example, the duration of PD initiatives is repeatedly listed as highly important in successful PD (Corcoran 1995; Crawford, 2003; Garet & Porter, 2001; Hiebert, 1999; Villegas-Reimers, 2003; Wells, 2007). Duration refers to how ongoing a PD program is, rather than how long specific events such as workshops run for. In addition, the need for relevant, active PD initiatives such as workshops and orientation sessions that engage the participants is commonly cited (Coggins, 2008; Corcoran, 1995; Crawford, 2003; Dias & Atkinson, 2001; Garet & Porter, 2001; Hiebert, 1999; Wells, 2007; Zemelman, Daniels, & Hyde, 2005). A third criterion of successful PD, according to the literature, is support offered to participants by change-agents, including follow-up support after the implementation of the PD initiatives (Coggins, 2008; Crawford, 2003; Wells, 2007; Villegas-Reimers, 2003). Research also included the need for a support group that is available to help educators in relation to technology-specific issues. Moreover, on-site, locally situated PD events that are organized and implemented by a change-agent is also commonly listed (Coggins, 2008; Chapelle, 2001; Corcoran, 1995; Crawford, 2003; Villegas-Reimers, 2003).

In addition, Havelock's model of change (1995) states the necessity of creating and using appropriate materials and resources within the context of a PD program. Havelock says that such materials should help to facilitate the change process without disrupting clients from their normal routines. He states that a variety of resources necessary to address the organization's needs can be used, and that they can come in many forms, including personnel, informational, and material.

Further criteria necessary for implementing successful change in use of technology relate to communication. Rogers (2003) states that a change-agent's success in enhancing the use of an innovation, is positively related to the extent of a change-agent's efforts in contacting an organization's members. Therefore, it is vital that clients (in the context of this study the clients were the university's faculty members) are informed about any changes that are made, and about how they may be introduced to any changes and helped in any kind of institutional transformation. Havelock (1995) also says that contacting an organization's members is an important stage for the change-agent to address during the change process.

This brief overview of the literature indicates that a number of criteria must be adhered to if change-agents want to successfully facilitate technology-related change within an organization. The literature suggests that if a change-agent adheres to the recommended

criteria during the implementation of a technology-related PD program, then the chances of successfully changing the technology use of clients will be enhanced. This study will examine whether or not the change-agent adhered to the criteria.

Method

Participants

For this study, the subjects were faculty members working at the university when the PD program was implemented and made available. The total number was approximately 45. Although all 45 participants came from the university in Japan, different numbers of participants were used during the different data collection phases.

Data collection

This study utilized a mixed-methods approach to collect the data. The different methods used during the data collection phase of this study are described below.

Online survey

An online survey was used to collect data relating to the impact of the PD initiatives. The survey was sent to 45 faculty members, and 42 responded. The survey was created using www.esurveyspro.com. It was designed so that when participants opened their email, they had to click on an embedded link, which then redirected them to the survey.

Semi-structured individual interviews

The follow-up individual interviews were used to provide more detailed insights into responses that came from the online survey, and to get a richer understanding of the impact of the Moodle-related PD initiatives. The interviews were semi-structured. According to Nunan (1992), in a semi-structured interview, the interviewer has a general idea of where he or she wants the interview to go, but does not enter the interview with a complete set of predetermined questions.

The participants for the face-to-face interviews were selected from the respondents to the survey. An advantage of the semi-structured approach lies in the interviewer being able to clarify questions if participants are unsure of the meaning, and probe for elaboration (Creswell, 2005). Participants were given the questions before the interviews so they could become familiar with the proposed topics (Merriam, 1998).

The face-to-face interviews were conducted as exploratory conversations rather than sessions where asking questions may have seemed as though specific, or contrived, answers were being searched for. Merriam (1998) argues that where a lack of theory exists to explain a current phenomenon, such as factors which influence faculty use of Moodle in an EFL context in Japan, a flexible, qualitative approach best enables the researcher to conduct research inductively. The participants for the face-to-face interviews were selected from the respondents to the online survey. As much as possible, the selected participants were chosen to represent a wide range of Moodle-user, as well as a broad cross-section of experience in the field of ELT, including experience in Japan. It was hoped that by including respondents with a wide

variety of backgrounds, experience in ELT, and Moodle-user habits, their answers would be representative of the wider Moodle-user population and their answers relevant to a wider audience.A full breakdown of the selected participants can be seen in Table 1.

Table 1: Participant information for face-to-face interviews

Identifier	Age	Finished Masters course	Years teaching	Years teaching at uni level	Year at university	Moodle use	Member technology committee
I-1	31–35	2006–8	7–10	4–6	3rd	Never	No
I-2	35+	2001–5	7–10	4–6	3rd	Never	No
I-3	31–35	2001–5	7–10	1st year	1st	In most classes	No
I-4	26–30	2001–5	4–6	1–3	3rd	Never	No
I-5	35+	2001–5	4–6	1–3	3rd	Never	No
I-6	31–35	2006–8	4–6	1st year	1st	Never	No
I-7	26–30	2006–8	7–10	1st year	1st	In some classes	No
I-8	31–35	1996–2000	7–10	7–10	4th	In all classes	Yes

Analysis

The following sections provide information about the methods of analysis used with the different forms of data that were collected, in relation to each of the questions in the study.

The first question of this study examined whether or not the PD program implemented by the change-agent adhered to technology-related PD best practice procedures. In order to do so, an original, best-practice rubric was created that contained a number of best practice criteria, drawn from a wide variety of scholars who had implemented effective technology related change at their respective institutions, especially in relation to teacher use of technology. These scholars have had their exemplary change programs featured in works such as *Developing Faculty to Use Technology*; *Teaching Faculty How to Use Technology*; and *Teacher Education in CALL*. The specific nature of the change effected by these specific scholars is available for further examination by looking at the articles provided in the references section at the end of this paper. In selecting best practice criteria for inclusion in the rubric, only those technology-related PD criteria that were mentioned by scholars and experts more than four times throughout the literature review were included. The decision to use four as the cut-off point was arbitrary, and was done primarily to ensure that only the most often discussed technology-related PD criteria were utilized. In limiting inclusion in the rubric to certain PD criteria that were mentioned four or more times by different scholars, nine criteria were used. They included *Support*; *Theory*; *Workshops*; *Relevance*; *Learner-centered*; *Manuals and how-to guides*; *Authentic examples of use*; *Access*; *Incentives*; and *Duration*.

In addition, certain criteria were also used in deciding which scholars and experts to include in the best practice rubric. Best practice definitions state the need to utilize the expertise of people in a field that may have significant experience and proven success. Therefore, in creating the rubric used to analyze the PD initiatives in relation to best

practice criteria, the educators and scholars selected for inclusion were all leaders in the field of educational technology, or technology-related PD, who had implemented successful PD programs at their educational institutions. The rubric can be seen in Table 2.

Table 2: Technology-related PD best practice rubric

Name, year	Support	Theory/ pedagogy	Work-shops	Relevant/ practical	Learner centred	Manuals/ how-to guides	Authentic examples	(Online) Access	Incentives	Duration
Coggins, 2008	×					×	×	×		
Clark, 2003		×	×		×	×		×		
Clark, 2006	×				×			×	×	
DeVry, 2003	×			×			×		×	
Egbert, 2006		×			×					×
Gamble, 2003	×			×		×		×		
Grant, 1996	×			×	×			×		×
Wells, 2007	×	×		×	×					×
Mathis, 2003	×				×	×	×	×		
Pollock *et al*, 2001	×				×	×	×	×		
Robinson Pearce, 2003	×		×	×	×		×		×	
Moore, 2001	×		×	×				×	×	
Epper, 2001	×			×	×				×	×
Hartman, 2001	×		×	×	×			×	×	
Hutchison, 2001	×		×		×			×	×	×
Rickard, 2006		×	×	×	×			×	×	
Wong & Benson, 2006		×		×		×				×
Robb, 2006	×	×	×	×	×	×	×	×	×	
Schwartz & Phillips, 2003	×	×	×		×		×	×		×

Online survey

Analysis of the online survey was carried out using SPSS. In the second question of this study, *What impact did the PD initiatives have on faculty use of Moodle?,* descriptive statistics were used to determine frequencies, means, and standard deviation for the construct *Impact of the PD initiatives*, containing seven items. In addition, a Spearman's Rank Order

correlation test was used to test for relationships between the dependent variable *How often did you use Moodle?*, and the construct *Impact of the PD initiatives*, containing seven items.

Semi-structured individual interviews

In analyzing the individual interviews, a number of techniques were used to look for keywords that expressed major concepts or ideas and allowed the researcher to classify the responses into emerging themes. Following the collection of data from the online survey, eight faculty members were interviewed. Upon completion of the interviews, the recorded audio was transcribed verbatim using Microsoft Word, each in different documents, according to the faculty member that was interviewed.

Results

Question 1: Did the PD initiatives that were implemented by the change-agent adhere to best practice criteria?

An analysis will be provided here to determine if the PD program implemented in this study adhered to technology-related best practice recommendations. The PD initiatives that were utilized will be compared with, and measured against, the criteria in the best practice rubric illustrated in Table 2.

Support

Fifteen of the nineteen PD experts cited in the rubric indicated that having a "support network" on hand to help faculty with issues related to technology was of utmost importance. Wells (2007) noted that long-term, continuous pedagogical, social, technical assistance was important in the implementation of successful, technology-related PD. The support network that existed at the university in this study consisted of six members, all of whom were Moodle users and comfortable in explaining and supporting different features of Moodle. Further, different support members had offices in different buildings, meaning that faculty had easy access to any technology support member, regardless of where their office was located. If faculty had to troubleshoot something, or felt they needed immediate on-campus support, it was readily and easily accessible.

Workshops

Eight of the CALL scholars whose work was drawn upon in the rubric stated the importance of using workshops to help teachers effectively learn about technology (Clark, 2003; Egbert, 2006; Robb, 2006; Wells, 2007). However, in examining the workshops implemented by the change-agent in this study, analysis indicated that they also met other important best practice criteria. The workshops were held once a week for an entire semester. The most convenient time was decided upon by an anonymous faculty vote. They were conducted by members of the university's technology research committee and in each workshop there was a support network of 5–6 expert Moodle users available to help any faculty participants with problems or questions they may have had. The workshops were voluntary and participation was not mandated.

The workshops adhered to the "support network" criteria, the most consistently referred to criteria in the rubric. The change-agent was responsible for running the workshops, and also for ensuring that relevant expert Moodle users were available for the workshops. Some committee members were more adept with some of Moodle's features than others, so the agent had to ensure that all support network members who were proficient in a particular Moodle feature were available for the workshop that matched that feature. If faculty members could not attend, or wanted to view the contents of the workshops later, everything was made available online, and faculty was notified of this after each workshop.

Relevant/practical and learner-centered

Eleven of the scholars used in the rubric referred to the importance of relevant/practical activities, and fourteen referred to the importance of learner centered PD activities. The PD workshops that were implemented by the change-agent illustrate how relevant and practical they were to faculty, as well as how they took a learner-centered approach. The workshops typically followed a 3-step process. The first involved a brief explanation of the technical aspects of the relevant Moodle feature being presented on the day, which mirrored what was in the freely available video-based and MS Word-based instructional manuals. Following that, two or three expert Moodle-users from the attendant support network would demonstrate how they were using that particular Moodle feature in their classes and explain the rationale behind it. And finally, participating faculty were given the option to practice using the feature in any way they wanted and to ask questions in relation to the specific Moodle feature. The workshops went for an hour, and participating faculty were sent a follow-up email to check on any issues they may have had. The workshops enabled participating faculty to see how expert users were using Moodle in their classes and a chance to experiment with ideas that they might realistically use in their own classes.

How-to manuals

From the rubric, seven people recommended that "how-to" documents in some form be used in Professional Development initiatives for faculty (Clark, 2003; Mathis, 2003; Robb, 2006; Wong & Benson, 2006). The how-to video guides were created by the change-agent and the technology committee overseen by the change-agent, and uploaded to the university's Moodle site. They were made available in two formats – a lower quality version available for immediate viewing online and a higher quality version that could be downloaded and saved to any user's computer. As long as faculty had an internet connection, then they could access both versions anywhere, anytime, regardless of their location, as the university's Moodle site was online. Moreover, The MS Word-based instructional manuals were designed to accompany and add to the video-based manuals described above. The MS Word manuals covered the same issues and points addressed in the videos. Faculty could access them online, or download them and keep hard copies.

Authentic examples of Moodle use in teaching practice

For each Moodle feature, or module as they are called in Moodle, such as Forums, Journals, Blogs, and Wikis, there would be authentic, step-by-step examples of how that particular

Moodle feature was being used by expert Moodle users in classes at the university. That allowed faculty members to see how to apply Moodle in real classes.

Access

Thirteen of the scholars used in the best-practice rubric place importance on access to PD materials. All of the help materials were on the university's Moodle site. So as long as faculty had an internet connection, then they could access all help materials anywhere, anytime, regardless of their location. On campus, faculty also had 9–5 access to the Moodle support committee.

Duration

Seven scholars state the importance of duration in successful technology-related PD. Further, they all say that the longer the PD is available, the better. This does not mean that the duration of specific events, such as workshops, must be longer, rather they should be ongoing on a weekly basis for interested faculty members, and available on an ongoing basis on a variety of platforms and mediums. In short, one-off PD sessions are not recommended. This is primarily to ensure that faculty members can access the PD initiatives at any time, at any place, even if they have no time to attend specific events such as workshops. The workshops for faculty in this PD programme ran for an entire semester, totalling 15 weeks. In addition, the help files that were uploaded were permanently available to faculty on the Moodle website. Finally, the support network on campus was available at all times during working hours, so there was no time that faculty members at the university could not make use of some sort of technology related PD facility.

Summary

By comparing the PD program with the best-practice rubric, it is clear that almost all of the most commonly cited criteria were adhered to during the implementation of the program. According to the literature, there was an implication that should these most cited criteria be adhered to in a technology-related PD program, then the effect on members of an educational organization would lead to increased use of technology, or specifically targeted technology. The next section will examine how effective the PD program was and whether it had a positive influence on faculty.

Question 2: What impact did the PD initiatives have on the use of Moodle among faculty?

Based on the literature, there was a belief that good PD would not only lead to increased awareness of Moodle as an innovation, but a concomitant increase in use among faculty members. However, survey results for the question *How often do you use Moodle*? indicate that that was not the case at all. Figure 1 indicates quite clearly that, despite the implementation of the PD initiatives, actual use of Moodle among faculty members did not increase or change very much. Indeed, more than half of the 42 faculty members who answered this question never used Moodle at all.

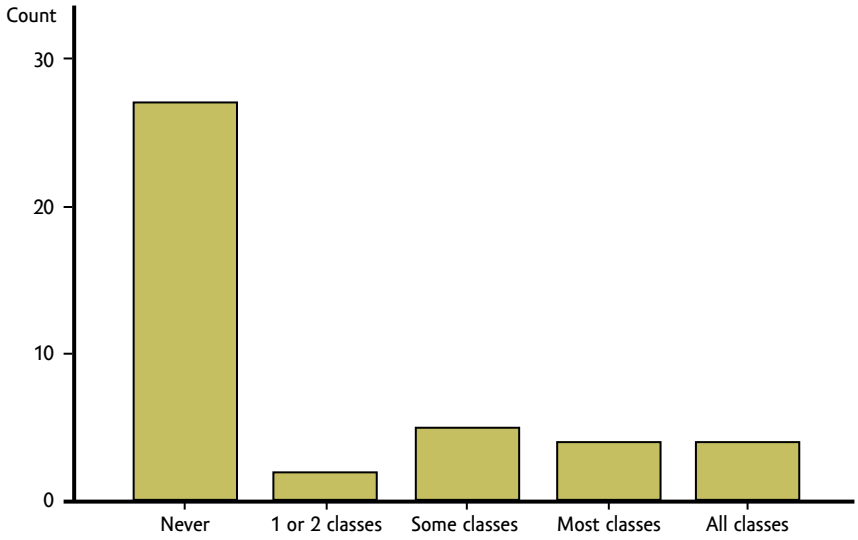

Figure 1. Use of Moodle among faculty members

This section explores the specific influence that the various PD initiatives had on faculty, and discusses issues relating to the unanticipated results.

The following section provides results for Question 2 *What impact did the PD initiatives have on the use of Moodle among faculty?* Data was collected using an online survey and interviews with selected participants.

Cronbach's Alpha test of reliability

A Cronbach's alpha test of reliability was performed on the construct *Impact of the PD initiatives* in order to examine the internal reliability of the construct and the items contained within. Brown (1998) says that "one fundamental concern in measuring anything is that the results should be the same every time you measure it" (p.121). Brown also says that one of the most common ways of testing for internal reliability in surveys is by way of Cronbach's alpha. The closer Cronbach's alpha coefficient is to 1.0, the greater the internal consistency of the items (Gliem & Gliem, 2003). George and Mallery (2003) provide the following rules of thumb: "$\alpha > .9$ – Excellent, $\alpha > .8$ – Good, $\alpha > .7$ – Acceptable, $\alpha > .6$ – Questionable, $\alpha > .5$ – Poor, and $\alpha < .5$ – Unacceptable" (p. 231). Nunnally (1978), also says that a Cronbach's alpha score of 0.7 - 0.8 or above is an acceptable indication of internal reliability, as does Field (2009).

Cronbach's alpha scores for the construct *Impact of the PD initiatives* ($\alpha = .922$) were well above the 0.7–0.8 threshold recommended in the literature (Field, 2009; George & Mallery, 2003; Gliem & Gliem, 2003; Nunnally, 1978; Pallant, 2001) Therefore, the construct *Impact of the PD initiatives* was considered to be internally reliable, and all items considered relevant.

Descriptive statistics

Table 3: Descriptive statistics for the construct *Impact of the PD initiatives*

	N	Mean	SD
The Moodle-related PD initiatives taught me more about Moodle.	33	4.03	.984
The Moodle-related PD initiatives gave me new ideas for my classes.	33	3.67	1.164
The Moodle-related PD initiatives gave me new perspectives on using Moodle in my teaching.	33	3.79	1.023
The Moodle-related PD initiatives made me feel less anxious about using Moodle in my classes.	33	3.52	.906
The Moodle-related PD initiatives enhanced my development as a teacher.	42	3.45	.942
The Moodle-related PD initiatives led me to take-up, and/or increase my use of Moodle.	42	2.71	1.419
The Moodle-related PD initiatives influenced my use of Moodle.	42	2.90	1.376

Each item in the online survey was positively framed. In four items, 33 faculty members responded. Nine participants were omitted from further analysis on these particular items because they selected the "Never Used" option in the survey when asked if they had used specific elements of the Moodle-related PD initiatives. The results indicated that the impact on the 33 teachers who used specific PD initiatives was generally positive – the mean score of those who made use of the PD initiatives ranged from $\bar{x} = 3.52$ to $\bar{x} = 4.03$ (3 = Neutral, 4 = Agree) for the five relevant items. This indicated that for those faculty members who made use of specific Moodle-related PD initiatives, such as how-to guides and workshops, the impact on them leant more towards "Agree" than "Neutral." It was interesting to note that for the two items that related specifically to use and increased use of Moodle – and which all participants had to answer – the mean score was much lower. For example, the item *The Moodle-related PD initiatives led me to take-up, and/or increase my use of Moodle* had a mean score of 2.71 (2 = Disagree, 3 = Neutral), while the item *The Moodle-related PD initiatives influenced my use of Moodle'* had a mean score of 2.90 (2 = Disagree, 3 = Neutral). This showed that, regardless of whether faculty members made use of the PD initiatives or not, the initiatives did not really lead to increased use of Moodle among faculty.

Spearman's Rank Order Correlation (SPSS)

A Spearman's Rank Order correlation was run in SPSS to identify any relationship between a) *How often do you use Moodle in your classes?* and b) *The impact of the PD initiatives* (containing 7 items). The results can be seen in Table 4, overleaf.

There was a significant, positive correlation between faculty use of Moodle and the impact of the PD initiatives on 6 of the 7 items. Four items had significant correlation at the 0.01 level (2-tailed), and 2 items had a significant correlation at the 0.05 level (2-tailed). Only 1 item had no significant correlation – *The Moodle-related PD initiatives made me feel less anxious about using Moodle in my classes* ($rs = .303$, $P = .086$). It was interesting to note that two of the four items which showed significant correlation at the 0.01 level related to how the PD initiatives taught faculty more about Moodle and gave them new perspectives on using it.

Table 4: Spearman's Rank Order correlation statistics for the construct '*Impact of the PD initiatives*'

How often did you use Moodle in your classes?	Spearman's Rho Correlation Coefficient	Sig. (2-tailed)	N
The Moodle-related PD initiatives taught me more about Moodle.	.484**	.004	33
The Moodle-related PD initiatives gave me new ideas for my classes.	.379*	.030	33
The Moodle-related PD initiatives gave me new perspectives on using Moodle in my teaching.	.523**	.002	33
The Moodle-related PD initiatives made me feel less anxious about using Moodle in my classes.	.303	.086	33
The Moodle-related PD initiatives enhanced my development as a teacher.	.344*	.026	42
The Moodle-related PD initiatives led me to use, and/or increase my use of Moodle.	.735**	.000	42
The Moodle-related PD initiatives influenced my use of Moodle.	.513**	.001	42

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Results from semi-structured individual interviews

Two faculty members who were interviewed (I-3, I-7) said the PD initiatives had a positive influence on them, including their adoption and use of Moodle. One teacher (I-7) said that he used the how-to manuals a lot to help him set up courses and get new ideas from other teachers who were using Moodle. He said, "The manuals were well made and useful. They were good because there was a document and video manual. I used the document more because I could download it, but I always watched the video first." The other teacher (I-3) who was positively influenced by the PD initiatives said that the PD initiatives, particularly the workshops, helped him with ideas in his teaching practice. He said the PD initiatives helped him use Moodle more efficiently and creatively.

> I would have tried different things myself, but the PD initiatives helped me with ideas. I reached a point during my first semester where I thought I'd hit a wall with Moodle and wasn't sure how practical it was going to be. Then I went to a workshop and it impacted on me and my use because I realized Moodle had a broader use and there were lots of things I could do with it. You can get stuck on simple things and get frustrated and then leave it alone, but seeing other ideas helps you to think of other ways yourself.

The same teacher (I-3) said that he also made constant use of the technology support committee. He believed that the ease in which he could consult committee members on the run made using Moodle easier, as he did not have to sift through how-to documents or send email inquiries. He said, "I often tried to teach myself, but if I ran into a brick wall, it

was nice to be able to pop next door or see a committee member and quickly ask them a question. Having that availability was convenient for my needs."

Another teacher (I-5) said that the PD initiatives had reduced any anxiety that may have been involved in using new technology. The PD initiatives helped with his use of Moodle in subsequent months because he was already much more familiar with Moodle than some other teachers who had not made use of the PD. He also said that as he had started to use Moodle, the PD initiatives had been helpful. He said that he had not had to start from "0" but from a 2–3 (5 being completely familiar with Moodle).

Two teachers (I-1, I-4) said that the PD initiatives had no impact on their uptake or use of Moodle whatsoever. One teacher (I-1) said that he taught himself most basic things, so the video manuals he saw did not teach him anything he did not already know. He already knew how to do most things. One main reason he gave for being familiar with Moodle was that other people in his committee had taught him about Moodle, and that he had learnt by copying what other teachers had been doing with Moodle in the same class. The other teacher (I-4) said that he never used Moodle, and switched off whenever conversations turned to Moodle. Therefore, the PD initiatives had no impact on him because he never used them or Moodle.

Discussion

How did the PD initiatives influence faculty in their use of Moodle?

There has been an implication presented in the literature that if best practice procedures are followed, the ensuing impact on technology use by teachers may well be positive and enhanced. A perfect example of this comes from Ertmer (1999), who said that faculty use and uptake of technology is influenced by a number of factors, which she referred to as "enablers" and "barriers." She said "enablers" include such things as access to hardware, quality software, the Internet, technical support, as well as administrative and peer support, and that it is likely that either a decrease in barriers, or an increase in enablers, would lead to greater technology use. Egbert (2006) added further weight to this idea when she said that teacher change and growth occur through learning that is situated in classrooms. The PD rubric that was created to analyze the PD initiatives implemented in this study also drew upon technology-related PD scholars, and used a number of criteria which suggested would have a positive impact on PD participants. Generally, the implication was that if PD initiatives followed the ideas of Egbert (2006), Ertmer (1999), and those scholars used in the rubric, then the impact on teacher uptake, and use of technology (Moodle), would be positive and noticeable.

In this study, it was demonstrated that technology-related best practice procedures were used in accordance with recommendations made in current PD literature. However, the results here seemed to indicate that the PD initiatives did not necessarily have the impact that the literature suggested they might. In looking at the results from the various sources of data, it was not immediately clear what kind of influence the PD initiatives had on faculty. In terms of simple numbers, the number of faculty members who utilized the PD initiatives and introduced themselves to Moodle definitely increased. So in that sense, the PD initiatives would appear to have been successful, and the ideas presented in the literature regarding educational technology best practice procedures correct. On the other hand, the

nature of how the PD initiatives were used, and the amount that Moodle was used in terms of modules and activities, tended to contradict the literature.

In examining the item from the online survey *the Moodle-related PD initiatives taught me more about Moodle*, the mean score of 33 respondents was $\bar{x}$ = 4.03 (4 = Agree). Further, in the Spearman's Rank Order correlation test, the correlation between the items *How often did you use Moodle in your classes?* and *the Moodle-related PD initiatives taught me more about Moodle* was significant at the 0.01 level (0.004). This suggested that faculty did learn more about Moodle through the PD initiatives, and that they led Moodle users to increase their understanding of Moodle. However, it must be noted that the item *the Moodle-related PD initiatives taught me more about Moodle* had a "Never Used" option, meaning that 9 participants of the 42 who took part in the online survey did not answer this item. This meant that the results related only to users who were already using Moodle and who made use of Moodle and the PD initiatives. So, in essence, the initiatives were effective on an audience that was already captured, but not on the more targeted audience of non-users of Moodle. One comment by a consistent Moodle user (I-3) during the face-to-face interviews illustrated this point. The respondent said that the PD initiatives were particularly helpful for him after he found that he could not think of any more original or unique ways to use Moodle.

However, a comment made by a non-Moodle user also demonstrated that the PD initiatives were not as successful with faculty who did not use Moodle. The respondent (I-4) said that he never used Moodle and switched off whenever conversations turned to Moodle. Therefore, the PD initiatives had no impact on him because he never used them, or Moodle.

Thus, one could argue that, as Egbert (2006) suggested would happen, some faculty growth and understanding may have occurred as a result of the PD initiatives, which was backed up by the mean score of $\bar{x}$ 4.03 (4 = Agree) for the item *the Moodle-related PD initiatives taught me more about Moodle*. However, these developments did not lead to increased use of Moodle or a significant change in teacher habits for non-users of Moodle.

This was clearly illustrated by results from the item *The Moodle-related PD initiatives led me to take-up, and/or increase my use of Moodle*, which had a mean score of $\bar{x}$ .71 (2 = Disagree, 3 = Neutral) for 42 users. This indicated that the actual influence of the PD initiatives was not as significant as may have been expected. Moreover, in the Spearman's Rank Order correlation test, the correlation between the dependent variable, *How often did you use Moodle in your classes?* and the independent variable *the Moodle-related PD initiatives taught me more about Moodle* was significant at the 0.01 level (0.000). The significance of this positive correlation (correlation coefficient .735**) suggested that faculty who did use Moodle, increased their use of Moodle, while faculty who did not use Moodle, did not increase their use of Moodle or take it up. Therefore, it seemed once again that the PD initiatives were particularly successful with faculty already using Moodle, but not so influential on faculty who were not using Moodle – ostensibly the audience who the PD initiatives were designed to target.

The results above referred to the PD initiatives as a whole, but did not focus on any specific initiative. However, if one specific PD initiative was focused on, the results were much the same, which is a result that was somewhat different from what the literature suggests. For example, in focusing on workshops, Brzycki and Dudt (2005) made the implication that if workshops paid sufficient attention to participants' specific needs and desires concerning technology integration, provided practice in transferring skills to participants' own situations, and provided ongoing technical assistance, then the results would be positive and that the workshops would meet their objectives. However, results from the workshops that

were implemented as part of the PD initiatives indicated that the impact was not as successful as anticipated. While the perceptions of faculty members toward the workshops were positive, the item *you will introduce ideas from this workshop into your classes* consistently showed the lowest mean score of around $\bar{x}$ 3–3.5 (3 = Neutral, 4 = Agree) across the eight different Moodle-related workshops. Therefore, the influence of the workshops on faculty use of Moodle was not as successful as best practice literature suggested it may have been.

One thing that came from the face-to-face interviews that had not been accounted for, or found in results from the online survey, was the indirect impact that the PD initiatives had on faculty. Through talking to a number of interview participants, it became obvious that even though a number of them had made very little first-hand use of the PD initiatives, their use of Moodle had been indirectly influenced by them. For example, one teacher (I-6) stated at the time of the study that he had never made use of the PD initiatives or been influenced by them. However, when he began using Moodle after the implementation of the PD program, he set up his course on Moodle on the advice and instruction of another faculty member (I-5) – one who had made use of the PD program. So the teacher (I-6) who had said that the PD initiatives had not influenced him at all had in fact been influenced by them, albeit in a more indirect fashion. This was also the case with I-1. He said that he had learnt most things from Moodle by himself, but had also learnt from other faculty members, who, incidentally, were part of the technology committee designed to help faculty with their use of Moodle. So even though he stated that the PD initiatives had had no impact on him, he was in fact influenced by them via the face-to-face support he received by technology committee members. This may well have continued to happen over the ensuing years, or at least while faculty members were employed by the university. However, such a longitudinal study was impossible in this context because almost all teachers were on limited term contracts. This is an issue that needs further explanation in the context of technology related ELT in Japan

In the context of this study it seems that, despite the extent of the change-agents' promotion efforts in implementing the various PD initiatives, they did not have as much of an influence on the use of Moodle among faculty as might have been anticipated. It has been shown that a number of recommended best practice criteria in relation to technology-related PD were utilized during the implementation of the PD program. Therefore, it was not unreasonable to anticipate that the impact of the PD program would be significant. However, results indicated that the desired impact of Moodle use among faculty was rather underwhelming. Therefore, perhaps there were other variables that were far more influential on the adoption and use of Moodle.

Conclusion

This paper examined a technology-related PD program that was implemented at a language university in Japan. It looked at the elements of the program itself, and then at the impact that the program had on its target – faculty members within the university. Prior research had indicated that if PD initiatives were implemented in adherence to certain best practice guidelines, then they would most likely have a positive impact on use of technology among members of an organization. However, results here indicated that the influence of the PD initiatives was mixed. They had a positive impact on faculty members who were already using Moodle, but they did not have as much influence on faculty members who

were not users of Moodle – ostensibly the people that the PD initiatives were designed to influence most

A positive aspect of the PD initiatives that had not been accounted for was the indirect impact that they had on some faculty. A number of faculty members noted that they had learned about Moodle not by the PD initiatives themselves, but by other faculty members who had learned about Moodle through the PD initiatives. Thus, there was a kind of second-hand learning, or learning that was passed down the line. This was positive because it indicated that information relating to an innovation can be diffused throughout an organization in different ways, as long as a good PD program is put in place. However, a limitation of doing research in the context of an institution with constantly changing personnel is that ongoing efficacy is almost impossible to measure.

Nonetheless, the key issue was no doubt the fact that the change-agent, in the context of Rogers' diffusion model (2003) and best practice literature, had done what was required and recommended according to best practice literature, yet the anticipated result was not forthcoming. This suggested that perhaps the efficacy of a PD program implemented by a change-agent is not always as immediately obvious as may have been predicted. Moreover, it suggested that perhaps the five variables Rogers (2003) lists as being most influential on the use of an innovation may not have equal influence and that some variables are far more influential than others. Further research may well indicate that of the five variables Rogers includes, some may even counteract the influence of others.

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