

The E-Learning Readiness of Cyprus primary teachers ahead of DIAS system integration into Cyprus schools

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Abstracts

English

This research study aimed to evaluate the e-learning readiness of Cyprus's primary teachers ahead of DIAS web-platform integration into Cyprus's schools. The Cyprus Ministry of Education and Culture (MOEC) aims through DIAS to enhance the integration of e-learning in all areas of the curriculum in primary and secondary education. As the effective implementation of e-learning in schools relies on teachers' abilities, beliefs and motivations, there is a clear need to understand where teachers are in terms of their level of ICT adoption, so that if necessary suggestions might be made for raising their e-learning readiness. This study focused on a theoretical framework that evaluated teachers' e-readiness by measuring their technological, psychological and pedagogical readiness for conversion to a blended learning system. The research used a questionnaire and an interview survey as principal methods of data collection. The research results revealed that Cyprus' primary teachers need continuous professional development in order to: (a) become psychologically ready to move towards e-learning and (b) to realize how pedagogical practices change in an e-learning environment. The study concludes by suggesting ways that might increase Cyprus' primary teachers' e-learning readiness, so that they will embrace the DIAS system in their daily teaching practices.

Greek

Σκοπός της παρούσας έρευνας ήταν η αξιολόγηση της ετοιμότητας των δασκάλων της Κύπρου στη διαδικτυακή μάθηση, ενόψει της ενσωμάτωσης της διαδικτυακής πλατφόρμας ΔΙΑΣ στα κυπριακά σχολεία. Το Υπουργείο Παιδείας και Πολιτισμού της Κύπρου στοχεύει μέσα από το ΔΙΑΣ να ενσωματώσει τη διαδικτυακή μάθηση σε όλες τις περιοχές τους αναλυτικού προγράμματος της πρωτοβάθμιας και δευτεροβάθμιας εκπαίδευσης. Όμως, η αποτελεσματική εφαρμογή της διαδικτυακής μάθησης στα σχολεία στηρίζεται στις ικανότητες, τις αντιλήψεις και τα κίνητρα των δασκάλων. Γι' αυτό και καθίσταται αναγκαία η μελέτη του βαθμού της ικανότητας των δασκάλων στην υιοθέτηση των ΤΠΕ στη διδασκαλία τους, ούτως ώστε να εντοπιστούν οι παράμετροι εκείνοι που θα ενισχύσουν τη διαδικτυακή τους ετοιμότητα. Η έρευνα βασίστηκε σε ένα θεωρητικό πλαίσιο το οποίο αξιολόγησε τη διαδικτυακή ετοιμότητα των δασκάλων μέσα από τη μέτρηση της τεχνολογικής, ψυχολογικής και παιδαγωγικής τους ετοιμότητα να υιοθετήσουν τις ΤΠΕ στη διδασκαλία τους. Η έρευνα χρησιμοποίησε ως βασικά ερευνητικά εργαλεία ερωτηματολόγια και συνεντεύξεις για τη συλλογή δεδομένων. Τα αποτελέσματα της έρευνας κατέδειξαν πως οι δάσκαλοι των δημοτικών σχολείων της Κύπρου χρειάζονται συνεχή επιμόρφωση ώστε (α) καταστούν ψυχολογικά έτοιμοι να υιοθετήσουν πρακτικές διαδικτυακής μάθησης και (β) να αντιληφθούν πως οι μέθοδοι διδασκαλίας διαφοροποιούνται σε ένα διαδικτυακό μαθησιακό περιβάλλον. Η έρευνα προτείνει μια σειρά εισηγήσεων για το πώς μπορεί να ενισχυθεί η ετοιμότητα των δασκάλων στη διαδικτυακή μάθηση ούτως ώστε να χρησιμοποιούν το σύστημα ΔΙΑΣ στις καθημερινές διδακτικές τους προσεγγίσεις.

Keywords

E-learning readiness, DIAS learning system, professional development

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Background

In 2008 the Cyprus Ministry of Education & Culture (MOEC) launched, in a pilot stage, a web-based

learning platform, named DIAS (<http://www.dias.ac.cy>). DIAS provides the schools with easy access to educational tools and content, endorsing e-learning in the Cyprus Educational System. MOEC expects DIAS to provide a new way out of teaching inequalities and to reform traditional teaching methodology. The system provides teachers with the capability to develop and deliver content material in a Radial model in order to satisfy students' individual needs and thus encourage their active participation in delivering and acquiring knowledge. Teachers are called on to utilize the system's capabilities by trying out new teaching methodologies so that all students are motivated to use DIAS virtual tools for constructing their own knowledge. Moreover, DIAS introduces a further innovation into Cyprus's educational system the opportunity for teachers, students and parents to actively collaborate in the learning process by using synchronous or asynchronous modes of communication.

It can be argued that DIAS has the potential to improve quality in Cyprus' education by providing equitable access to a high quality web-based system that respects individuals' needs and freedoms. However, having the capability to access an e-learning environment is not in itself sufficient to reveal what functionings users can achieve for improving quality in learning. Robyens (2005) explains that the relationship between possessing a "good" (e.g. access to an e-learning environment) and the functionings to achieve certain beings and doings (e.g. achieve quality learning) is influenced by three groups of conversion factors: (i) personal conversion factors, (ii) social conversion factors and (iii) environmental conversion factors. Yates (2007) agrees that these factors influence the ability of the teacher to convert the characteristics of the "good" into the achieved functioning.

What research has shown so far is that while ICT policy investments around the world have resulted in a dramatic increase in the number of computers in schools and classrooms, and the access that teachers and students have to the Internet (Anderson & Ronnkvist, 1999; European Commission, 2003; Pelgrum, 1999), the ultimate aim for high ICT use by the majority of teachers has not yet been accomplished (Becker, 2000; Cuban, 2001; Downes, 2002; Kozma, 2003). The European Commission's (2006) research on how ICT is used in schools showed that even though almost all schools in Cyprus had computers and internet access at that time, only 31% were using the internet with primary teachers being less ICT competent and confident than educators in upper schools.

Actions for e-learning had mistakenly been based on the assumption that good internet connectivity and high quality equipment would be enough for teachers to move towards innovative e-learning practices. But teachers' e-learning readiness also plays an (if not the most) important role in shaping e-learning integration. Research confirms that only when teachers are comfortable with using ICT will they be able to incorporate them successfully into their own teaching (Wills & Alexander, 2000). Therefore, to initiate the change to e-learning, it is important to assess the readiness of teachers (Sorenson & Reiner, 2003). The emphasis now is on teachers' e-learning readiness and, more importantly, on how this can be evaluated in order to provide key information for developing teachers' skills and competencies for innovative e-learning pedagogical practices (European Commission, 2003). Reflecting on the literature, the key point raised by this research is that before Cyprus primary schools start integrating e-learning technologies, they must ensure that teachers are ready to support this innovation otherwise e-learning practices will be limited. In response to this, the study attempted to evaluate teachers' capabilities to function DIAS, by examining three core factors: (a) ICT competence, (b) teaching practices and (c) attitudes towards e-learning.

Research Methods

The research study used two principal methods of data collection. The first was a questionnaire survey, designed to provide basic data about Cyprus' primary teachers' e-learning readiness. This was followed by interviews, to add depth and understanding to the issues and factors which influence teachers' psychological and pedagogical e-readiness.

Population and sample

The questionnaire was sent to a random sample of **480 teachers** from a population of 3986 teachers working in 344 Cyprus primary schools during the school year 2007-08. The size of the sample was chosen according to the Krejcie and Morgan sampling table (in Cohen *et al.*, 2000:94), which advises that if the size of the population is 4000 then the appropriate random sample size should be no less than 351.

Questionnaires were sent to the head-teachers of 60 primary schools, who were requested to distribute them to eight of their teachers, to collect them back and to return them to the researcher. This approach enabled a large enough sample of teachers to be surveyed and thus to facilitate detailed exploration of the issues and factors which influence teachers' technological, psychological and pedagogical readiness to adopt e-learning in their teaching.

The questionnaire survey was followed up by one-to-one interviews with eight practicing teachers. The interviews were conducted one-to-one and focused on a framework of questions designed to probe psychological and pedagogical readiness in more depth. Moreover, in order to have some information about how pre-service teachers believe their studies prepare them to integrate e-learning into their teaching, the researcher conducted face-to-face interviews with five pre-service teachers.

Data analysis methods

The questionnaire was structured in order to yield coded responses that could be easily analyzed to analyze the questionnaire data. The survey's data were analysed using basic descriptive statistics and factor analysis, using SPSS (Statistical Package for the Social Sciences).

Data Analysis

Questionnaire data analysis

From the 480 questionnaires that were randomly sent to schools, a total of 384 were returned, giving a response rate of 80%. According to Krejcie and Morgan (in Cohen *et al.*, 2000:95) when the size of total population is 4000, then a minimum sample size of 351 gives a 5% margin of error with a confidence level of 95%.

Specifically, 79% of the respondents were female and 21% were male. As to work location, 64% of the respondents worked in urban schools and 37% worked in rural schools. Over half the respondents were in the age group 26-35 years, with another third in the age group 36-45 years (Table 1a). Years of teaching experience varied fairly uniformly, with a small minority of respondents – just under 10% – reporting having been teaching for more than 20 years (Table 1b). The distribution over grade levels being taught was even more uniform (Table 1c).

Table 1a. Respondent age distribution

Respondent age distribution	
<i>Age group (years)</i>	<i>%</i>
Over 56	1
46-55	3
36-45	31
26-35	57
Under 25	8
<i>Number of respondents</i>	<i>384</i>

Table 1b. Respondent teaching experience

Respondent teaching experience	
<i>Teaching experience (years)</i>	<i>%</i>
Over 26	3
21-25	6
16-20	22
11-15	29
6-10	23
1-5	17
<i>Number of respondents</i>	<i>384</i>

Table 1c. Respondents' grade level(s) of teaching

Respondents' grade level(s) of teaching	
<i>Grade</i>	<i>%</i>
A	12
B	11
C	11
D	14
E	15
F	16
Several Grades	21
<i>Number of respondents</i>	<i>384</i>

Teachers' ICT competence

Before exploring teachers' opinions about integrating DIAS and e-learning into teaching, it is necessary to explore their technological readiness. Nearly all teachers (99.2%) reported that they had a computer at home, and the vast majority of those with a home computer had internet access. Interestingly, the majority of the respondents had received some kind of ICT training, as Figure 1a shows. It is also worth noting that more than half of the respondents had participated in the Pedagogical Institute's ICT seminars.

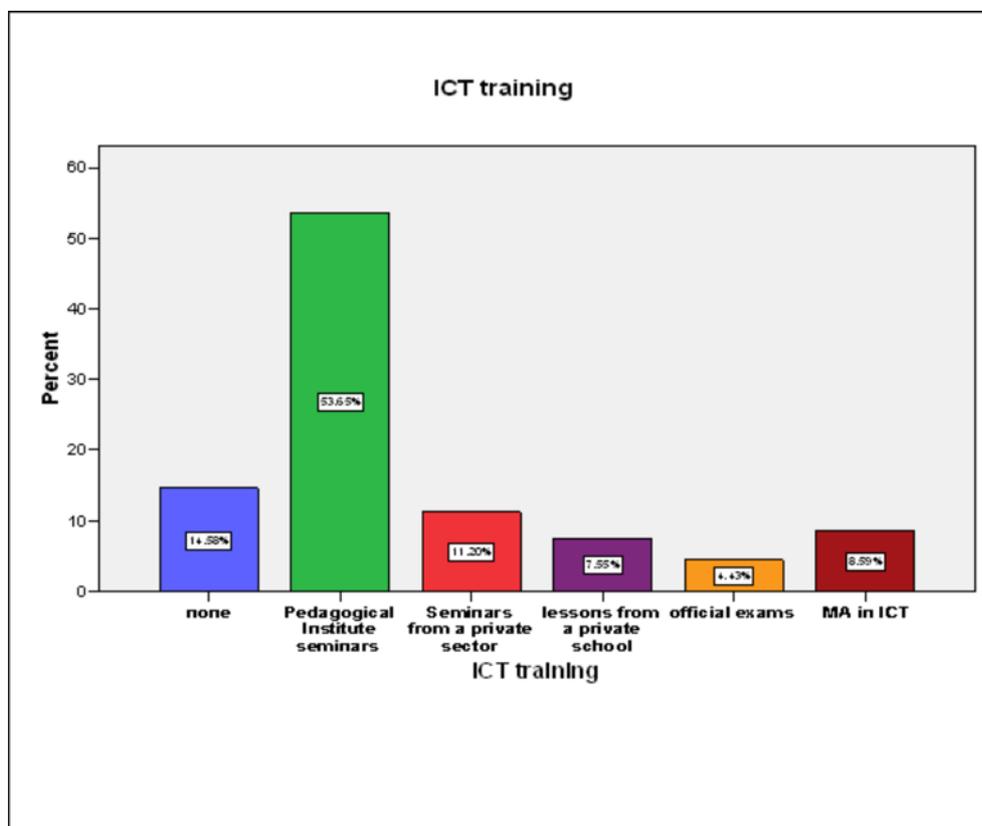


Figure 1a. Respondents' ICT training

As Figure 1b shows, the majority of the respondents claimed to feel most competent when using word processing and presentation tools, searching the internet and sending e-mails. In contrast, more than half of the respondents reported that they were not competent when using videoconferencing tools and virtual learning environments.

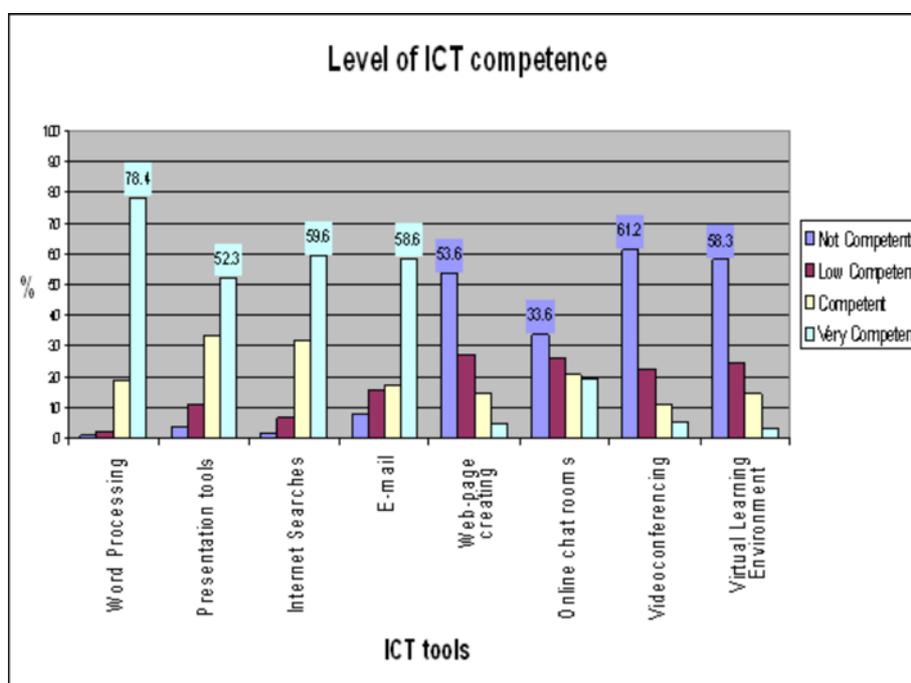


Figure 1b. Respondents' levels of ICT competence

Teachers' views about DIAS integration (Psychological readiness)

On the whole, the respondents were positive when reflecting on the impact of DIAS on student learning. As can be seen in Table 2, 74% of the respondents agreed, to some extent, that DIAS can increase students' learning, and 78% believed that DIAS can increase students' ICT confidence.

Table 2. Teachers' views about DIAS integration

Teachers' views about DIAS integration (384 respondents)

What do you think about DIAS?	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
	%	%	%	%	%
1. DIAS will increase my preparation time.	2	13	40	32	13
2. DIAS will enable me to design activities that will increase students' learning.	1	2	23	54	20
3. DIAS will enable me to communicate More efficiently with my students.	2	7	46	34	11
4. DIAS will enable me to collaborate and share tasks with colleagues.	1	5	35	45	14
5. DIAS will increase students' Confidence/skill in the use of technology.	1	1	20	53	25
6. To integrate DIAS into my teaching I need Inservice training on ICT technological skills.	3	5	20	36	36
7. To integrate DIAS into my teaching I need Inservice training on ICT pedagogical skills.	1	11	16	35	37
8. To integrate DIAS into my teaching I need to have in school adequate technical support.	0	1	7	27	65
9. To integrate DIAS into my teaching I need the head teacher to support my efforts.	2	5	15	44	34
10. To integrate DIAS into my teaching I need my colleagues to support my efforts.	4	14	25	36	21

However, 40% of the respondents appeared to be unsure about whether DIAS will increase their preparation time, and only 45% agreed that they will need more time to prepare. Similarly, only 45% of teachers tended to agree, to some extent, that DIAS will enable them to collaborate more efficiently with students, and nearly half of them (46%) appeared to be unsure. Well over half (59%) agreed that DIAS will enable them to collaborate and share tasks with their colleagues. This is in line with the fact that just 57% of the responding teachers admitted that in order to integrate DIAS into their teaching they would need their colleagues to support their efforts. On the other hand, 78% of teachers said that they felt it important to have their head teacher's support for integrating DIAS.

The majority of the respondents agreed, to some extent, that in order to integrate DIAS into their teaching they will need in-service training in ICT technological skills (72%) and ICT pedagogical skills (72%). Interestingly, more than nine out of ten of the respondents (92%) considered it important to have adequate technical support within the school.

Teachers' views about e-learning (Pedagogical readiness)

Table 3 presents respondents' views on integrating e-learning into teaching. The majority of teachers (77%) agreed or strongly agreed that virtual learning environments encourage learning. In contrast, only 38% agreed or strongly agreed that e-mail communication between teacher and students encourages learning, with half being unsure.

Table 3. Teachers' views about e-learning

Teachers' views about e-learning (384 respondents)					
What do you think about e-learning?	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree
	%	%	%	%	%
1. Virtual Learning Environments encourage learning.	<1	<1	22	56	21
2. E-mail communication between teacher and students encourages learning.	1	11	50	30	8
3. I don't think I need e-learning Skills to progress in this profession.	11	41	24	20	4
4. My pre-service training prepared me well enough for e-learning pedagogy.	22	43	16	15	4
5. I have adequate skills and knowledge to integrate e-learning into my teaching.	7	24	34	28	7
6. I would like to integrate e-learning into my teaching but I don't have the time.	2	23	22	44	9
7. I am willing to change my teaching style to integrate e-learning activities.	1	2	17	62	18

8. I feel competent enough to rely on e-learning as a core teaching medium.	10	21	42	22	5
9. It's important for my school to have a shared vision on e-learning pedagogy	1	1	12	54	32

Just over half of the respondents disagreed or disagreed strongly that they didn't need e-learning skills to progress professionally. Around two-thirds (65%) disagreed or strongly disagreed that their pre-service training had prepared them well enough for e-learning pedagogy. It is therefore notable that one third of teachers (35%) agreed or strongly agreed that they had adequate skills and knowledge to integrate e-learning into their teaching, one third were unsure (34%) and one third believed they lacked adequate skills (31%).

Despite their lack of skills the majority of teachers (80%) reported that they were willing to change their teaching style in order to integrate e-learning activities. More than half of them (53%) stated that they would like to integrate e-learning into their teaching but that they didn't have the time to do so. However, only one in four (27%) felt competent to some extent to rely on e-learning as a core teaching medium. Nearly one third (31%) stated that they didn't feel competent enough and two-fifths (42%) were unsure if they had adequate competence. Nevertheless, more than four-fifths (86%) believed that it was important for their school to have a shared vision for e-learning pedagogy.

Interview data analysis

In-service teachers' views

Interestingly, all participants expressed their interest and willingness to explore the DIAS e-learning context. However, almost all of them expressed their dissatisfaction about not having been adequately informed about DIAS by the Ministry of Education. As indicated in their questionnaire responses, most of them didn't feel ready to integrate e-learning into their teaching.

In general, the opinions of the interviewees were in line with those of the larger group of teachers that answered the written questionnaire. In their view, DIAS has the potential to positively influence teaching and learning in Cyprus primary schools. All the interviewees pointed out that DIAS will provide teachers with easy access to a variety of ICT learning materials. According to the participants the first and most vital factor for the successful integration of DIAS is for teachers to receive training on how to integrate e-learning into their teaching. All participants pointed out that the training should be in school hours and should focus on specific examples of how DIAS can be used in teaching. The second factor that participants regarded as important is the provision of adequate technical support. All participants expressed their dissatisfaction with the current situation where technical support is not provided on a regular basis. The lack of technical support and maintenance seems to de-motivate most participants to try to use DIAS in their teaching. Almost all of them expressed concern that DIAS might not be embraced by teachers due to the lack of technical and pedagogical support.

Moreover, one third of the participants shared the view that integrating ICT tools into teaching requires more preparation time by teachers and thus the majority of them will not be interested in using DIAS. Nevertheless, more than half of the participants identified a need for a team that would provide continuous feedback and support to teachers' efforts. Overall, it was noted that participants had insufficient knowledge about e-learning pedagogy.

Pre-service teachers' views

On the whole, the interviews with these individuals suggested that they had sufficient knowledge about the pedagogical value of e-learning. Most of them referred to the positive effects of e-learning such as motivating students, providing opportunities for constructivist learning, enriching learning with activities that reflect the different learning styles, and making learning more student-centered. However, all of them shared the view that it is not necessary for a teacher to have knowledge about e-learning in order to be effective. In the participants' view, e-learning is a useful tool for teachers who want to enrich their teaching style.

Only one participant claimed that her studies had well enough prepared her for integrating e-learning into her teaching. Two participants reported that they were not sure whether they had received adequate preparation, and two participants said that they didn't feel prepared enough. Interestingly, four out of five reported that they felt most competent when using word processing and presentation tools, searching the internet and sending e-mails. In contrast, they all reported that they were not competent when using videoconferencing tools and virtual learning environments. Most of them suggested that in-service teachers should receive training on how to integrate e-learning into teaching. Nevertheless, all of them but one expressed their interest to learn more about DIAS programme and try to integrate it into their teaching.

Conclusions

Interpreting the results

Specifically, the analysis of the results revealed the following regarding participants' three levels of e-readiness:

(A) Technological readiness:

- The majority of the respondents had received some kind of ICT training and half of them had participated in the Pedagogical Institute's ICT seminars.
- The majority of them claimed to feel most competent when using word processing and presentation tools, searching the internet and sending e-mails.
- Half of the respondents reported that they were not competent when using videoconferencing tools and virtual learning environments.

(B) Psychological readiness:

- Most of the respondents agreed that DIAS can increase student's learning and their confidence in the use of ICT.
- Fewer than half of them agreed that DIAS will enable them to collaborate more efficiently with students.
- Fewer than half of the respondents agreed that DIAS will increase their preparation time.
- Over half of the respondents agreed that they would need their colleagues' support to integrate DIAS effectively, and that DIAS will enable them to collaborate and share tasks with colleagues more easily.
- The majority of the respondents said that they felt it important to have their head teacher's support for integrating DIAS.
- Almost all of the respondents considered it important to have adequate technical support in-school.
- The majority of them agreed that in order to integrate DIAS into their teaching they will need in-service training in ICT technological and pedagogical skills.

(C) Pedagogical readiness:

- The majority of the respondents agreed that the VLE will encourage learning.
- Only a minority of them agreed that e-mail communication between teacher and students encourages learning.
- Fewer than half of them agreed that they needed e-learning skills to progress professionally.
- Few agreed that their pre-service training had prepared them well enough for e-learning pedagogy.
- Only one third of the respondents felt that they had adequate skills and knowledge to integrate e-learning into their teaching.
- Most of them reported that they were willing to change their teaching style in order to integrate e-learning activities.
- More than half of the respondents stated that they would like to integrate e-learning into their teaching but they didn't have the time to do so.
- Only one in four of the respondents felt competent enough to rely on e-learning as a core teaching medium.
- The majority of them believed it was important for their school to have a shared vision for e-learning pedagogy.

Implications of findings for policy and practice

The findings indicate a range of implications which the MOEC might wish to consider for enhancing e-learning in primary schools, including the following:

Establishment of a comprehensive e-learning policy

Initially it is necessary for MOEC to establish a comprehensive official policy for primary education, which would determine the role and potential of e-learning, its educational value and the length and type of classroom use. This view is in line with a European Commission research (2006) suggestion that MOEC needs to clarify its educational vision for ICT. It is this researcher's opinion that the absence of a national e-learning policy jeopardizes the whole scale integration of e-learning, as on the bottom line this means that integration remains optional, leaving it is up to teachers' personal interest and willingness to adopt it. The study suggests that MOEC should clearly inform teachers about the context, aims and rationale of DIAS before integrating into schools.

Enhancing teachers' technological confidence

A variety of studies indicate that technology will have little effect on learning unless teachers are adequately and appropriately trained (Silverstein et al., 2000; Sandholtz *et al.* 1997). This survey's findings indicate that primary teachers need to receive technological training that will raise their confidence in using ICT tools in their teaching. Specifically, this study suggests that primary teachers need adequate training and time in order to develop competence when working within the DIAS context, especially for using synchronous and asynchronous communication and collaboration tools (e.g. Videoconference, Virtual Whiteboard). MOEC acknowledges this need and plans to provide a training programme in order for teachers to learn how to make best use of DIAS tools. However, this study suggests that training should be offered during working hours, in order for more teachers to be able to participate and benefit from it.

Combining the "e" with the "learning"

The study has provided evidence to support the view that if e-learning is to be effective, teachers need to conceptualize in depth how they can combine the "e" with the "learning". The literature clearly indicated that: "It is not technology, but the instructional implementation of the technology that determines the effects on learning" (Collins, 1996:146). The current study suggests that MOEC's training programme should be based on a series of stages that will help teachers to progress gradually from familiarization with DIAS tools to the integration of e-learning into their daily teaching practices.

The added value of e-learning

The study findings indicate that even if teachers receive training in how to integrate e-learning into their teaching they will be willing to change their practices only if they are convinced of the value of e-learning. "The knowledge, beliefs and attitudes that teachers have... shaped what they choose to do in their classrooms and explain the core of instructional practices that have endured over time" (Cuban, 1993:256). The study confirms that it would be beneficial if teachers could be informed about worldwide research evidence indicating ICT's "relative advantage" (Rogers, 2000) and the positive effect e-learning can have on students' achievements.

Planning with technology

Fishman and Pinkard (2001) observe that the focus should move from "planning for technology" to "planning with technology". Consequently, the philosophy, aims, goals and objectives of the school must be used as a guide for the vision, goals and objectives of the technology programme (Craig, 1996; Cuban *et al.*, 2001). However, as with any new policy planning, interest groups must be dealt with within the policy process, otherwise they will use everything in their power to manipulate the policy to meet their own objectives (Haddad, 1995). Therefore, this study suggests that policy planning should not be imposed through a top-down strategy, but rather that teachers should actively participate in decision making. The evidence indicates that teachers need to have the space to express their views on how they regard this new innovation, and what they need in order to integrate it into their teaching. This can be fostered through cooperation between MOEC and the teachers' association (POED).

Cross-curricular integration of e-learning

Evidence from other studies has indicated that e-learning practices are more likely to happen when there is coherence among curriculum, assessment, instructional materials and instructional guidance (Kozma, 2003). The findings from the present study support the view that teachers might be more motivated to integrate DIAS if this is embedded into the curriculum. The cross-curricular integration of e-learning requires teachers to have access to specific and practice-oriented materials and activities for all the curriculum subjects.

Students learning with technology

Over a decade ago, Laurillard (1995) explained that there was a need to move the learning emphasis from "learning for technology" to "learning with technology". However, in order for primary students to be able to learn with technology, they first need time to learn how to use ICT tools. Therefore, this study suggests that it might be helpful if all grades have an ICT lesson that will help students to develop basic ICT skills. Gradually, as students develop their ICT skills and move from lower to upper grades they may be encouraged by teachers to go beyond the drill and practice activities to higher-order uses of ICT tools.

Technical support

There is no e-learning without the "e" (EIU, 2003). Undoubtedly, the first ingredient for integrating DIAS into schools is high quality infrastructure, technical support and maintenance. MOEC is already in the process of upgrading schools' infrastructure by providing more computers per student, high quality hardware and software, internet access, interactive boards and laser printers, and by establishing intranets within schools. However, the findings of this study indicated that the lack of continuous technical support could demotivate many teachers from using DIAS. BECTA research (2004) confirms that when there is a lack of technical support and maintenance teachers tend to avoid using technology in the first place. Therefore, the present study suggests that it will not be enough for MOEC to invest only in the provision of the infrastructure. It could be more productive for MOEC to spend less money on infrastructure and keep a high budget for technical maintenance. In order to afford the necessary technical support, MOEC could cooperate with a reliable ICT company which will commit to provide schools with in-time technical support and maintenance.

Continuous professional development

The study identifies that in-service continuous professional development might enhance teachers' e-learning readiness. Professional development means developing a vision built on the understanding that technology is a tool that can offer solutions to long-standing teaching and learning problems (Web-based Education Commission, 2000). It might be useful if MOEC considers designing its future training programmes based on the main qualities that are identified as most effective for teachers' professional development, such as: the relevance of workshop activities to classroom activities, building online communities (Salpeter, 2003), modeling around adult learning theories (Mouza, 2002), collaborative learning and peer tutoring (Gradler *et al.*, 2002), hands-on-integration emphasis, modeling, mentoring and coaching (Roblyer & Erlanger, 1998). Since DIAS provides the space for online communication, MOEC could consider fostering the creation of an online community where teachers could communicate with each other and with the DIAS support team, for cooperation, guidance and support. In order for this cooperative relationship to succeed it might be helpful if: (a) a technologically and pedagogically literate team focus on providing in-time guidance and feedback to teachers, and (b) teachers have some free-teaching time for participating in this community. Moreover, it might be helpful if in every school there is a coordinator who would focus on a daily basis on helping teachers to integrate e-learning into their teaching.

Pre-service training for e-learning

The evidence of this study indicated that e-learning integration might need to be started by the academic staff in teachers' pre-service programmes. It is paradoxical that new teachers still enter schools feeling that their studies have not prepared them for a school world that is moving towards e-learning. In contrast, it should be expected that new teachers should be the very people most aware of the potential benefits of e-learning and who should therefore support the e-learning innovation. Therefore, this study suggests the potential value of cooperation between MOEC and the University of Cyprus for the provision of a course that will help future teachers to develop technological and pedagogical skills on how to integrate an e-learning context, such as DIAS, into their teaching.

E-learning culture

Overall, integrating DIAS into schools is not a technical issue but a sociological experiment. It requires a significant culture change in the Cyprus primary education context in order for teachers to develop the willingness and capability to integrate e-learning into their teaching. Moreover, e-learning success depends on society's beliefs and attitudes towards education in general and e-learning in particular (EIU, 2003). Consequently, the successful integration of DIAS in schools generally depends on the e-learning readiness of all education stakeholders (students, parents, policy-makers, institutions etc.). Therefore, in order for e-learning to flourish in schools it requires a culture that will support and promote e-learning development within the society. The main conclusion is that the ultimate goal should not be for teachers merely to be implementers of DIAS, but rather to become developers of learning environments where e-learning is integrated to facilitate knowledge construction.

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