Barriers to the Effective Use of Technology in Education: Case Study of UAE University

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Abstract: While the number of computers in the classroom continues to increase and tremendous support for technology integration exists in academia, a major discrepancy exists between the level of technology use expected of educators and the actual use and integration of technology in the classroom. This article examines barriers that impede the effective use of technology in education.

Index terms: Classroom technology, Professional development, Smart boards, Technology Plan

1. Introduction

Whether technology should be used in classrooms is no longer the issue in education. Instead, the current emphasis is ensuring that technology is used effectively to create new opportunities for learning and to promote student achievement. Educational technology is not, and never will be, transformative on its own, however. It requires the assistance of educators who integrate technology into the curriculum, align it with student learning goals, and use it for engaged learning projects.

Dowling & Harland (2001) observed two math classes using technology in the classroom and noted that the students were motivated and, for the most part, fully engaged. In Laura Dowling's observations, it was noted that there needed to be an additional adult in the room to assist the students when difficult questions arose. Direction sheets given by the instructor proved also to be essential.(1)

"Teacher quality is the factor that matters most for student learning," note Darling-Hammond and Berry (1998).(2) Therefore, professional development for faculty becomes the key issue in using technology to improve the quality of learning in the classroom.

In this sense, Franklin & others (2009) studied a mentoring relationship among elementary teachers in a rural school district and graduate students in instructional technology in the College of Education at a university in the Midwestern United States. Teachers identified common barriers to technology use: vision, access, time, assessment, and professional development.
The mentoring relationship provided the professional development support needed to promote opportunities for modeling the curriculum integration of technology, redesigning lessons around technology-rich resources, and overcoming barriers to technology use (3) Many organizations are instituting mentoring programs as a means of enhancing recruitment into the field, upgrading skills, increasing job satisfaction, and retaining employees in a mobile job market (4).

Other factors affecting the implementation of technology:

1. Resistance to change:
    A. Cohen points out that schools and the nature of teaching have remained relatively unchanged for hundreds of years.
    B. Marcinkiewicz believes that people avoid using computers because they fear a loss of status and hard-earned skills and do not have adequate knowledge.
    C. Mandated change in education typically results in superficial adoption rather than incorporating the substance.
2. Teachers' attitudes:
    A. Using Rogers' model, adopters of technology fall into one of five general

categories: innovators, early adopters, early majority, late majority, and laggards.

B. Only 16% educators fall into the innovator and early adopter categories.

3. Professional development: training , time, and support .(4)

Lack of professional development for technology use is one of the most serious obstacles to fully integrating technology into the curriculum

According to a recent survey by two largest teachers' unions, most educators are enthusiastic about the role technology can play in improving learning, but many still feel unprepared to take advantage of digital tools in the classroom(5). What's stopping them? The persistent barriers could include too few computers, a lack of technical support, and inadequate professional development.

Meanwhile, the Office of Technology Assessment's 1995 report on teachers and technology indicated that schools have made significant progress in implementing technology to help teachers use basic technology tools but they still struggle with integrating technology into the curriculum (6).

The National Center for Education Statistics (2000) studied the integration of various technologies in the teaching/learning process. The Center reported the following examples of how teachers had integrated technology: 44% reported using technology for classroom instruction, 42% reported using computer applications, 12% reported using practice drills, 41% reported requiring research using the Internet, 20% required students to use technology to solve problems and analyze data, 27% had students conduct research using CD-ROMs, 27% assigned students to produce multimedia reports/projects, 23% assigned graphical presentations of materials, 21% assigned demonstrations/simulations, and 7% assigned students to correspond with others over the Internet (7).

On the other hand, Redmann, Kotrlik & Douglas addressed how technology was being integrated in the teaching/ learning process in secondary marketing education programs for four distinct and independent phases: Exploration, Experimentation, Adoption, and Advanced Integration. The phases in which marketing teachers were most active are exploration of the potential of using technology in the teaching/learning process, and adopting technology for regular use in instruction. They are not very active in the experimentation phase, but they are operating at a moderate level in the advanced integration phase. Teachers perceive that minor barriers exist that prevent them from integrating technology into the teaching/learning process among which is professional development. But, in general, they perceive they are good teachers (8).

Professional development for technology use should be an integral part of the college technology plan or an overall college-improvement plan, not just an add-on. Initial inclusion in the technology plan ensures that professional development is considered an essential factor in using technology to improve teaching and learning

The technology plan, with its important professional development component, should be written by a technology planning committee or team. The group approach ensures that all stakeholders support the integration of technology into the curriculum as well as sustained professional development in technology use for all teachers and administrators. The technology planning team ensures that the professional development component of the technology plan is research based and meets high standards for effective staff development (9).

Sources of professional development standards include the five tenets outlined in the Policy Position paper, developed by the National Board for Professional Teaching Standards, and the Standards for Staff Development, developed by the National Staff Development Council (10). The technology planning team has important things to think about when reviewing the professional development section of a technology plan, such as the following: How do

instructional and technological goals affect professional development? What is expected from the staff as a result of their professional development? Who will manage, design, and deliver the professional development?

Above all, the technology planning team should determine the school's current level of technology use. Materials such as the Seven Dimensions for Gauging Progress of Technology in the Schools, developed by the Milken Exchange on Educational Technology, and the Learning with Technology Profile Tool, developed by North Central Regional Technology in Education Consortium, can be used to assess the school or district's current technology practice and provide a point of comparison

Training is needed not only for faculty, but also for students. More than 1,200 schools have participated in GenYES(Youth & Educators Succeeding) programs, which include training for students and on-site professional development for teachers. Sylvia Martinez, president of Generation YES (Youth & Educators Succeeding) believes that we can teach students to help teachers use technology more effectively in the classroom.We've got twelve years of data that says we can(11). GenYES encourages teachers to learn about Professional development that's embedded in the classroom has more staying power than one-shot workshops. Martinez also advises sharing the vision of twenty-first-century learning with students.?'

"Access, Adequacy, and Equity in Education Technology," published by the National Education Association and the American Federation of Teachers, provides several broad recommendations for effecting change over the long term. They include: Improve classroom access to hardware, software, and the Internet, bolster technical support, strengthen professional development around the instructional uses of technology, and enlist teachers unions to advocate for tech funding and support (12). Yet it fails to offer solutions for educators looking to take immediate action.

UAEU is steadily improving its world ranking. Last year it placed 374th and rose two spots, coming in at 372 this year in the QS World University Rankings 2010. The organization ranks top universities in the world. It is considered the strongest university in the Arab region. UAEU ranked 202 in the Life Sciences and Medicine and 235 in the Arts and Humanities . And recently(Fall 2010) it opened the new campus which is equipped with the latest technology, particularly in terms of processing classes, providing them with the best digital technologies and laboratories to upgrade the University's teaching and linking education with technology.

And in this sense, the CET(Center for Educational Technology)at UAEU offers some training courses/workshops to train Faculty to use the latest teaching techniques and the latest Software within classrooms, many of which are one-shot workshops. In addition , A Complete user manual for SMART's "Notebook " Software was distributed among faculty who attended the introductory workshop that was held two days before the fall semester commences and is also available at the UAEU website.

The mission of CET is not only to show faculty what buttons to push, but also to clearly detail exactly when, where, how and why these tools should be used to enhance faculty's teaching practice and their student's learning. This fall,the CET continues its efforts to help UAEU faculty innovate and invigorate their teaching with the new Mobile Media Initiative. Using inexpensive, highly portable and easy-to-operate devices, any professor or student can now create amazing digital multimedia materials that are ready to use instantly.

<u>The New campus Classroom technology in UAEU:</u>

Visionaire is the Dubai-based company that designed, selected and installed the classroom presentation and information technology devices on the new campus.
Most classrooms feature Smart Boards with integrated projectors. In larger classrooms, a

different product called a Sympodium is used. They look much like a large LCD monitor.

The so-called SMART boards can be used as a projection surface for any image that can be displayed on a computer screen. Smart board surfaces are touch sensitive and can be used like a giant trackpad to interact with and control the connected computer.

On September 7th,2010, Visionaire invited staff from the CET to see and interact with a fully-equipped and operational new-campus classroom for the first time.

Based upon information gleaned from Visionaire on that day, the Center for Educational Technology has assembled three basic methods for teaching in classrooms on the new campus:

1. Method : Traditional

Nearly all classrooms are supposed to have at least one dry-erase whiteboard surface. Faculty can recognize these normal whiteboards by their glossy look and smooth texture. Additionally, many are bordered top and bottom with thin, metal mounting strips. Faculty will need to bring their own dry-erase markers.

Some larger classrooms do not appear to have any dry-erase surfaces. In these rooms there is an extra-wide projection screen bordered in a thick black velvet frame. Of course, Faculty can never use makers of any kind on the Electronic Whiteboards

2. Method 2: Standard

Visionaire has equipped new-campus classrooms with what they call a "Media Processor Appliance" or MPA. These devices are essentially Intel-based computers running a modified version of the Windows 7 operating system.

Although they are computers, the majority of classroom MPA devices are not equipped with monitors, keyboards, CD/DVD Drives or mice. Everything you do with an MPA must be done using the Electronic Whiteboard, its LCD projector, virtual keyboard software and touch sensitive surface.

A three-port USB hub is mounted on the underside of each teachers desk. The hub has no external power connection, so you can only use low-power USB devices like memory sticks. Devices like USB Hard Disks will not function unless they have an external power cable.

Visionaire has sole administrative access to the MPA systems and has configured them with a customized user interface and a selection of software applications they have selected. Faculty can use the MPAs and the software they contain to access files that have been saved on USB memory sticks or that have been uploaded to network-accessible storage devices, shared drives, etc.

Faculty wishing to access Network Storage devices should check with their department's IT Coordinator(s) to learn if/how your network resources have been set up on the new campus and how to access the ones you need to use.

As mentioned, MPAs are not equipped with CD/DVD drives. If you wish to play video materials in class, they must be converted into compatible formats and saved as files on a USB or a network drive. At this point in time WMV files appear to play reliably

Importantly, classroom sound systems are not yet functional. As such, all audio output from the MPAs is currently disabled. Faculty requiring sound output is advised to bring their own PCs and external speakers.

Visionaire has installed the following core programs on the MPA systems: Microsoft Office Viewer Applications, Internet Explorer, Windows Media Player, a ZIP File Compression Utility, a PDF Reader and Smart Technology's Notebook program and hardware drivers.

The MS Office Viewer programs allow only the opening and viewing of files. Creating, editing, saving or printing of MS Office Documents is not possible when working through the MPA devices with the Viewer programs currently installed. The MPAs appear to operate inconsistently with the Smart Boards when viewing MS Office documents or web pages with Internet Explorer. In tests, the CET technicians have been unable to make digital ink annotations reliably on MS Office documents or webpage screens. Annotating using the Word Viewer is possible, but not, for example, when using the PowerPoint Viewer.

Teachers wanting to do annotations are advised to become familiar with the operation of Smart's "Ink Layer" feature in order to avoid confusion.

Smart's special "Notebook" Software functions as expected and should be used by all faculty

members wishing write or draw on an electronic whiteboard. All of Smart's electronic ink capabilities and other features are available using Notebook. Documents created using Smart's Notebook software can also be edited and/or saved when using the MPA. Faculty should make sure they save any and all edited Notebook documents to a personal USB memory stick or network storage space. Files mistakenly saved to an MPA's internal disk will be automatically erased.

Internet Explorer can be used to access a variety of websites. Certain browser plug ins or extensions might not be available on the MPA. It is advisable to check all website content in advance to make certain it can be viewed properly through the MPAs browser.

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Method 3: Personalized

The classroom MPA devices also allow you to plug in your own desktop or laptop computer and display its screen through the Smart Board's projector--just as you would expect a normal LCD projector to function.

When an external computer is connected, faculty can, of course, use whatever programs, data, etc., are available on your computer. The MPA system and its functionality are bypassed for that connection. Cables for your computer's video, audio and network ports are located beneath a panel on the surface of the teacher's desk . In rooms equipped with a single Smart Board, once a laptop was connected, the display switched to the laptop after about 20 seconds. The change is automatic. Faculty do not need to press any buttons on the Smart Board, but they may need to toggle an external-display mode on your laptop and/or adjust their screen resolution in order to send a compatible video signal.

In rooms equipped with dual Smart Boards, once a laptop is connected, one of the displays will be switched to the laptop while the other will continue to show output from the MPA. In tests, it was not possible for the user to select which board/projector displayed which content.

Sympodium-Equipped Rooms

In rooms too large for Smart Board's to be seen clearly by the audience, Visionaire has installed ceiling mounted LCD-projectors. These are connected to a similar, but larger MPAs and to monitors with touch-sensitive screens called Sympodiums or "Smart Podiums"as they have recently been rebranded. These devices are manufactured by the same company that makes Smart Boards, so their functionality is similar.

From interactions during the first week of classes with representatives from Visionaire, CET has collected some questions/observations from faculty and CET staff along with Visionarie's responses regarding their equipment and installations. These questions/answers were posted on the UAEU website. But are these efforts sufficient to prepare faculty to use this new classroom technology? And what are the barriers that impede the effective use of this technology?

Research Questions: The study addresses a number of questions as follows:

1. Is the type of faculty professional development and training of technicians offered by CET sufficient?
2. Do just faculty members need training in the use of those techniques or that students also need this training?
3. Is the problem in integrating technology into the curriculum, align it with student learning goals, and use it for engaged learning projects?
4. How is technology being integrated in the teaching/ learning process in terms of Exploration, Experimentation, Adoption, and Advanced Integration?
5. What are the needs of faculty to integrate technology in their teaching process development?
6. What are the barriers to effective use of technology in education from the viewpoint of faculty and student?
7. Do fewer technicians hinder effective use of educational technology? Or is the reason the insufficiency of equipments and lack of maintenance?
8. Could Mentoring help in overcoming barriers to technology use?

This study aims to finally reach a strategy and plan of action to ensure the best and effective use of technology in Education .The strategy should determine the role of each partner in the

implementation process without adding additional burdens to the University budget. .

2. Methodology

The study will be collecting data through:

1. Surveying a sample of 100 faculty representing the different departments of the College of Humanities and Social Sciences, the biggest college in the university in terms of faculty and number of students.

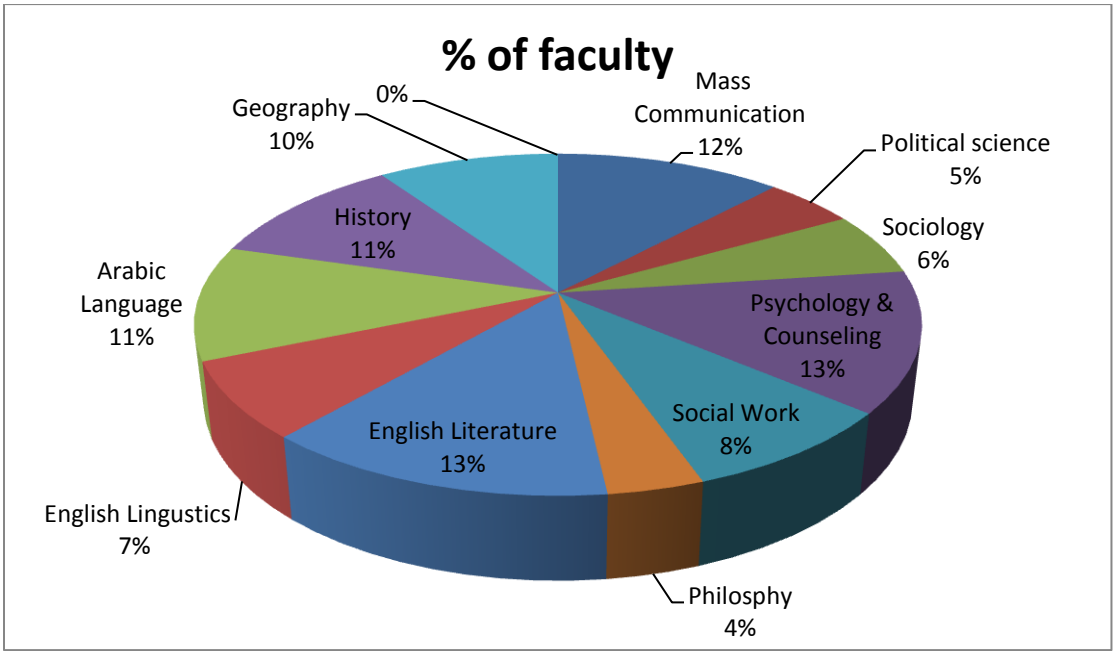

Fig. 1 Sample of the Study

A questionnaire was designed to identify the extent of using the classroom technology, barriers to effective use of technology and their future perspective in that respect.

2. This along with a series of focus group discussions with samples of students (8 subjects) and technicians (8 subjects) who are in charge of operation and maintenance of that technology.
3. Class Visits to observe the effective use of technology in education. Eight classes were selected from FHSS.
4. Moreover, the syllabi of selected courses (8 courses from the FHSS) were analyzed to ensure the integration of technology in the learning process.

And finally, we through this study aim to involve the three parties (faculty-students- technicians) in developing a plan of action and strategy for using effective teaching techniques to develop classroom teaching process.

3. Key findings

I. <u>The extent of using Classroom technology:</u>

II. The majority of FHSS faculty believe that classroom technology facilities learning (89 %) but do not use it frequently (61%). Some do not even use it to take the attendance(29%), because the virtual keyboard enables the students to easily recognize the password of the teacher.

III. A considerable number of faculty members (41%), mainly Arabs, disagree with the idea that students can help teachers use technology more

effectively in class .On the other hand, students confirmed during focus group discussions that they frequently help faculty in using the classroom technology. Some technicians also expressed the fact that they receive several technical support requests from faculty, some of which are handled by students. This can be explained in the framework of the Arabic culture which ensures the fact that education should be a one way channel (Instructor- students) .

IV. The advantages of classroom technology in the viewpoint of faculty are:
   a. Offers more visualized content (graphics, websites,--etc.) 72%
   b. Offers a better variety of teaching methods 63%
   c. Provides easy access to different resources the same time in the classroom 60%
   d. Offers easy access to the advanced uses of blackboard in class 58%
   e. Enhances idea sharing in the classroom 41%
   f. Increases instructor to student interactions 32%
   g. Provides better collaboration between students 8%
   h. Enhances the preparation and management of the class 3%

But they cannot fully benefit from these advantages (79%) as 65% need more training on using this technology in class and 39% need training on the advanced uses of blackboard. They expressed that all the workshops organized to enhance faculty's skills in using blackboard were introductory rather than advanced. It is worth noting that 37% of the surveyed faculty indicated that they could not show educational videos because the majority of classroom MPA devices are not equipped with CD/DVD Drives or external speakers. 17% of faculty said they cannot convert their videos into compatible formats and save them as files on a USB or a network drive. They sent several requests for technical support in that respect , but they received no prompt response.

II Barriers to Effective use of technology in the classroom:

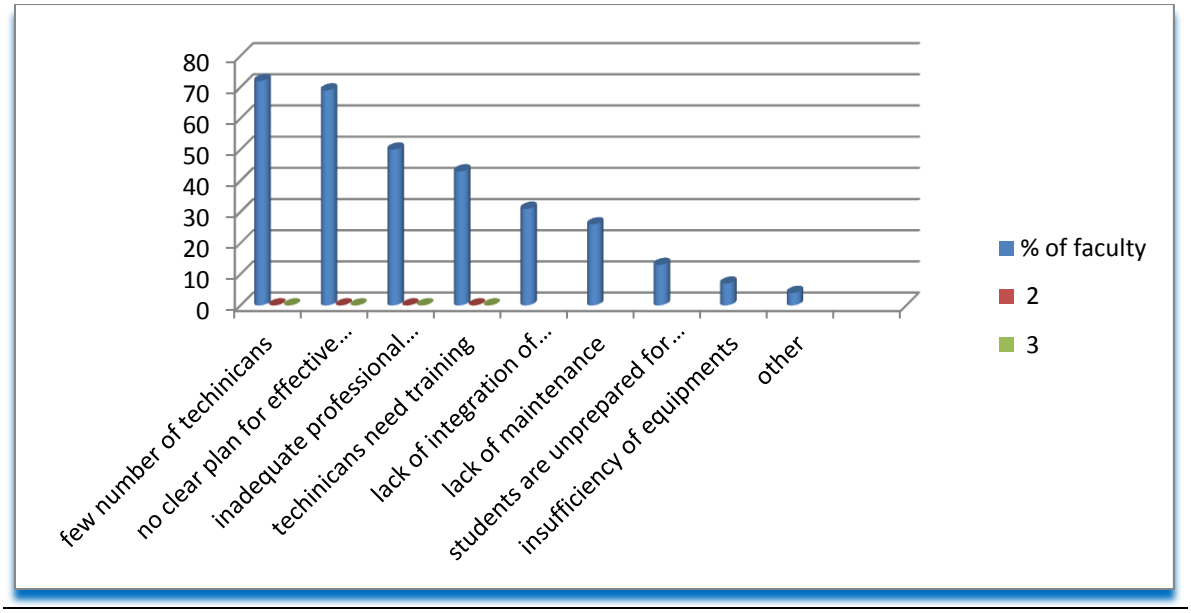

Fig.2 Barriers to the Effective use of Technology in Classrooms

1. 78% of FHSS faculty indicated that the few number of technicians in the college hinder the effective use of classroom technology and is considered the main obstacle in that respect. There were no significant differences between faculty members from different departments in that respect. Moreover, it is was observed during Class visits that faculty facing technical problems do not receive prompt help from technicians due to the few number of technicians available in the College female campus(two for classrooms, one for Labs and another for faculty offices). On the other hand, students agreed with faculty that the few number of technicians is a problem. They believe that this problem faces only FHSS as other Colleges as the college of law has no technical problems due to the adequate number of technicians.
2. 93% of faculty confirmed that the problem is not the insufficiency of equipment as all classrooms are equipped with either smart boards or Sympodiums. Technicians also ensured that labs have been doubled in terms of number and capacity. The problem in the viewpoint of 26% of the faculty surveyed is in the maintenance of these equipments. They revealed that even the technicians of Visionaire are incapable of providing prompt maintenance.
3. 31% of the faculty believe that one of the barriers to the effective use of technology is integrating the classroom technology into the teaching process and only 9% indicated that they developed their syllabi of their courses to integrated the classroom technology into the curriculum. This could be due to the quick move to the new campus before preparing faculty and technicians to be capable of dealing with the classroom technology. Few faculty not exceeding 13% believe that the reason is that the students themselves are unprepared to use this new technology. On the other hand, students supported by technicians ensured that they help faculty in dealing with the new technology. Class visits also supported these findings. Moreover, analyzing a sample of the syllabi of courses showed that faculty did not modify their curriculum to integrate the classroom technology into the teaching process.
4. Class visits showed that the phases in which faculty were most active are exploration of the potential of using technology in the teaching/learning process, and adopting technology for regular use in instruction. They are not very active in the experimentation and advanced integration phase.
5. More than half the faculty (69%) indicated that the reason beyond all the difficulties they faced with the classroom technology is that there is no clear plan in regard to the use of the classroom technology and this could be due to:

a. Some Classroom equipments are not functional citing for mention the sound systems. All audio output from the MPAs is disabled. Faculty requiring sound output is advised to bring their own PCs and external speakers.

b. Technicians did not have adequate training on using this new technology. It is worth mentioning that Visionaire invited staff from the CET to see and interact with a fully-equipped and operational new-campus classroom for only one scheduled time.

c. Faculty did not receive any training regarding this new technology. Only one-shot workshop was organized for one hour for some faculty the day before the classes started.

6. More than half of faculty (59%) and technicians believe that mentoring is a promising way to provide teachers with professional development in technology integration. Faculty who supported mentoring indicated that it could provide vision to them for designing lessons around technology-rich resources, solving technical support

problems, and using technology in the teaching and learning process. Techinicans, on the other hand , confirm that the mentoring process could provide a model for overcoming the barriers to technology use.

4. Conclusion

In Conclusion, the barriers to the effective use of classroom technology could be due to the lack of clear plan in regard to this technology. Therefore, we end this study with an action plan that could be applied to guarantee the effective use of classroom technology and integrating it into the teaching process:

I. Professional Development:

1. Fully implementing an effective professional development program as part of a well-designed technology plan requires support from college administrators and leaders. Administrators must have a clear vision of technology to support student learning and an understanding of the roles that all college staff must play in achieving that vision. They must be the cheerleaders and visionaries who see beyond the daily routine to a vision of what is possible through the use of technology. Administrators also can participate in professional development activities so they are aware firsthand of how technology is used and what problems are experienced by the staff.
2. Strengthen professional development around the instructional uses of technolgy. The CET should schedule a number of long term workshops to enhance faculty's skills in using classroom technology and on how to develop their syllabi to integrate this technology in the teaching process. It was found that teachers who received technology training in the past year are more likely than teachers who hadn't to say they feel 'better prepared' to integrate technology into their classroom lessons," notes Fatemi (1999). "They also are more likely to use and rely on digital content for instruction, and to spend more time trying out software and searching for Web sites to use in class.
3. Develop strategies for making time for professional development activities related to technology use. Build adequate time into the college day to allow teachers to practice, plan, refine, and reflect upon technology use. Consider innovative scheduling options such as "banked" time and block scheduling to allow collegial activities using technology
4. Consider Mentorship as an effective tool to overcome barriers to technology use. Mentorship provides models of computer use to the classroom teacher and help in lesson plan design .Studies proved that Mentoring helped the teacher develop strategies for overcoming the barriers of vision, time, access, and assessment.
5. Emphasize the new roles of faculty .Technology encourages teachers to take on new and expanded roles, both inside and outside of the classroom. Within the classroom, technology supports student-centered instruction. The teacher assumes the role of coach or facilitator while students work collaboratively (Jones, Valdez, Nowakowski, & Rasmussen, 1995; Kupperstein, Gentile, & Zwier, 1999). Outside of the classroom, technology supports teacher collaboration. Instead of working in isolation, teachers can work together to find solutions to problems, act as peer advisors to provide information and feedback, and collect data to test hypotheses (Lieberman, 1996; Little, 1982). Their new roles may involve distance collaboration with cross-school peer groups and study groups through telecommunications (Kosakowski, 1998).
6. Focus on building a knowledge base about teaching and learning with technology to ensure that technology

planning, decision making, and professional development are based on research.

7. Ensure that the educational goals for technology are aligned with College goals for student learning and that professional development supports those goals
8. Clearly specify the intended outcomes of the technology professional development. Develop a plan for evaluating the success of professional development activities using various assessment tools and strategies
9. Recognize teacher successes with technology. Share these stories with the school and the community. Encourage teachers to share their successes with colleagues at conferences.

II. Technical Support:

10. The effective use of classroom technology should become one of the priorities of UAEU strategy. The management should support the effective use of technology. A significant portion of the technology budget should be allocated for professional development. College districts typically devote no more than 15 percent of their technology budget for teacher training, but a better amount would be 30 percent .
11. Provide sufficient technical training to technicians. Visionare should schedule periodic training for enhancing the skills of technicians in using and dealing with the problems of this technology.
12. Providing access to on-site technical support personnel who are responsible for troubleshooting and assistance after the technology and lessons are in place. When teachers are trying to use technology in their classrooms and they encounter difficulties, they need immediate help and support. Technology that is not easily accessed and implemented will not be used.
13. Recommend the purchase of specific technologies to achieve the identified learning goals.
14. Ensure that technology purchases are considered to be supplies. Ensure that such purchases have ongoing funding and are included in all parts of the budget from building and maintenance to instructional supplies.
15. Develop a process for selecting and using appropriate software to support learning goals.
16. Pursue strategies for obtaining and sustaining funding to provide the necessary technology, professional development, technical support, equipment upgrades, and equipment maintenance to achieve educational goals.

All partners should help in implementing this action plan including faculty through the following steps:

1. Develop strategies for using technology to improve student achievement.
2. Develop an individual professional development plan that provides for acquisition of technology skills and integration of technology into classroom projects
3. Form study groups to explore issues, share assessments of student work, and identify strategies for improving technology use.
4. Engage in collaborative planning and evaluation.
5. Take on new and expanded roles as part of professional development. Such roles might include devising individual professional development plans, acting as peer advisors and mentors, collecting data, and forming study groups.
6. Pursue innovative ideas for using community resources to provide and support professional development in technology use.
7. Visit other Colleges and classrooms to see how technology has been integrated effectively into the curriculum. Or

virtually visit classrooms by viewing CD-ROMs (such as the Captured Wisdom CD-ROM Library, produced by the North Central Regional Technology in Education Consortium), videotapes of technology use in schools, or Internet sites relating to technology integration in content areas (such as the Handbook of Engaged Learning Projects).

8. At faculty meetings, share ideas for using technology within different content areas.
9. Attend and present at conferences to learn more and share ideas about teaching with technology.
10. Use telecommunications (such as e-mail lists and mail groups) to become part of a community of teachers. Form peer groups across schools, and join subject-matter networks and collaboratives to communicate about technology.

Finally, we hope the implementation of this action plan could help in overcoming the barriers to the effective use of classroom technology in FHSS. However, further studies are needed to clarify and compare the barriers that face other colleges in UAE University in regard to this new classroom technology, particularly Technical Colleges as the Engineering and IT Colleges.

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