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Abstract

This paper focuses on understanding the practice of teacher educators in implementing the Intel® Teach Essentials Course at four sites in the provinces of Punjab and Sindh in Pakistan. The focus is on teacher educators’ practices rather than the practice of teachers and hence the research sites selected for the study are teacher education institutions where the Intel® Teach Program is being implemented for teaching prospective teachers.

A qualitative study was undertaken selecting 21 teacher educators and interviewing them on key objectives of the Intel Teach program. The findings are encouraging, and show that teachers in both rural and urban areas have benefited from the program. Access to computers, follow-up activities and integration of the course in the syllabi of TEI institutions are challenges that need constant attention. Recommendations in three areas (a) changes/modification in the Intel course and delivery, (b) follow-up activities and (c) policy initiatives are included.
This paper focuses on understanding the practice of teacher educators in implementing the Intel Teach Essentials Course in selected sites in Pakistan. The focus is on teacher educators’ practice rather than the practice of teachers and hence the research sites selected for the study are teacher education institutions where the Intel® Teach Program is being implemented for teaching prospective teachers.

The paper further looks at the factors that have supported or hindered teacher educators in implementing the practices proposed by the Intel course. The Intel® Teach Essentials Course is a professional development program for teachers focusing on technology integration into teaching and classroom practices. This course comprises of ten modules that is taught over a time period of 40 hours in the pre service environment. It allows teacher educators to provide teachers with training to integrate technology effectively into a curriculum that generates student-centered, inquiry-driven, project based learning.

Over 6 million teachers both at the in-service and pre service level have participated in the Intel® Teach Program in over 40 countries.

The course participants develop a unit plan or a lesson plan for implementation in their classroom. This involves the development of teaching plans, evaluation tools and resources to support the unit. It provides a context in which the participants can further develop their technology skills and their understanding of the impact and implications of using technology to enhance 21st century learning.

Partnerships between Intel® Education Initiative, the Ministry of Education Pakistan, pre-service governing bodies and the Teacher Education Institutions (TEI) have been instrumental in promoting, driving and sustaining the increasingly robust implementation of the Essentials Course across the pre-service sector in Pakistan. In the Punjab it has been undertaken from December 2005 through the Punjab Provincial University of Education (PPUE) Punjab, which has affiliated colleges and campuses spread all over the province. The total enrollment has been more than 8,000 pre service teachers annually.

The implementation of this program in Sindh started from February 2008, when a Memorandum of Understanding (MOU) was signed between Intel Pakistan and the Menrah University of Sindh (MUS) to train 1,000 student teachers annually. All faculty members of the Faculty of Education, at the University of Sindh have received training in the Intel Teach Essentials Course. They plan to integrate this course into the existing university curriculum so that future teachers are trained in effective integration of technology into the existing K-12 syllabus. In Karachi, which is a part of Sindh, this program was initiated by training the Faculty of the Karachi Institute of Teacher Education (KITE) a TEI in the private sector, in July 2007. The faculty has been implementing certain modules of the Intel Teach Essentials Course since then.

1 Pseudonyms have been used for the names of all institutions for the purpose of confidentiality.
The implementation of Intel Teach Essentials Course is relatively new in Pakistan and has met with a great deal of success in this short period – the major benefits to the teacher educators and prospective teachers is improved computer skills, and more effective and interesting learning for their students. However, the implementation and practice of using Intel Teach Essentials Course does face some major challenges which includes, lack of access to resources and infrastructure, lack of incentives to put into practice the program and mismatch between teacher education curriculum and the Intel program (Oakley, 2008; Pakistan Pre-service Evaluation Summary). Hence, an in-depth study to develop an understanding of teacher educators’ practice with the aim of identifying examples of best practice to assist Intel Education in Pakistan to change the perception of technology integration from the development of computer skills to a deeper understanding of how technology can support an innovative approach to teaching and learning was needed.

The Intel® Education Initiative has consistently invested in the evaluation of the Essentials Course worldwide as well as in Pakistan, both for the continuous improvement of the program and its implementation model, and to document and demonstrate the impact of the program on its teacher participants. A large number of studies to ascertain the impact of the initiative on teachers have been undertaken, but few studies have focused on teacher educators (Light, et al. 2006. Feather, 2007). There is a need for a better understanding of the classroom practice of teacher educators in the context of Pakistan and other developing countries. This is because the teacher educators work within a policy context that is not supportive of implementation of professional development initiatives. In the case of ICT integration, this lack of implementation is further exacerbated by lack of infrastructure and ICT resources.

The focus of this study was to identify the practices of teacher educators’ in implementing Intel Teach Essentials Course to attain the core objectives of the course, and to identify the enabling and hindering factors in implementing the principles and ideas propagated in the course. This study was not envisioned as third party evaluation but an identification and understanding of the practice of teacher educators undertaken by the Intel trainers themselves. The findings from this study aim to contribute to the understanding of how the course is used by the teacher educators themselves and will help to improve the way the course is conducted in Pakistan.

Methodology
An in-depth field-based study was undertaken in the Punjab and Sindh provinces of Pakistan with the help Intel Teach Program trainers. The sample of Teacher Education Institutions within each province was selected based on the following criteria:

- They represent a range of contexts (rural and urban, large and small, private and public, different levels of technology resources and connectivity, etc.)
- They are institutions that are considered to be delivering the course effectively within their particular context and limitations (i.e. they are believed to be working towards the core objectives of the course)
They are available for interview within the limited timeframe

Keeping these criteria in mind the following teacher education institutions were approached for the purpose of the study:

Table 1: Sampling Plan

<table>
<thead>
<tr>
<th>Public/Private</th>
<th>Description</th>
<th>Technology Resources</th>
<th>Number of Teachers Educators trained (approx.)</th>
<th>Suggested sample size of research participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Punjab Provincial University of Education, Lahore, Punjab (Ravi Road Campus and Town Campus)(^3)</td>
<td>Public</td>
<td>Large &amp; urban</td>
<td>Good</td>
</tr>
<tr>
<td>2.</td>
<td>Punjab Provincial University of Education, affiliated college Lohari, Punjab</td>
<td>Public</td>
<td>Small &amp; rural</td>
<td>Fair</td>
</tr>
<tr>
<td>3.</td>
<td>Menrah University of Sindh, Jamshedabad, Sindh</td>
<td>Public</td>
<td>Small &amp; rural/urban</td>
<td>Good</td>
</tr>
<tr>
<td>4.</td>
<td>Karachi Institute of Teacher Education, Karachi</td>
<td>Private</td>
<td>Small &amp; private</td>
<td>Good</td>
</tr>
</tbody>
</table>

A total of 21 teacher educators from the four research sites as listed above were selected as research participants. The data collection was undertaken in three steps. First, a written semi-structured questionnaire was designed, which had open-ended questions and included questions that elicited examples of actual teaching practices in the classroom setting. Second, in-depth interviews were conducted with all 21 of the research participants, all of whom were faculty members at the four research sites listed in Table 1. Data was collected with the help of semi-structured interviews (see Appendix A for interview guide). The semi structured interview questionnaire consisted of 13 questions which focused on:

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\(^2\) Sampling plan is based on information on participating teacher educators available with Intel (see Appendix B).

\(^3\) Pseudonyms have been used for the names of all institutions for the purpose of confidentiality.
- Use of technology for lesson preparation
- Implementation of teachers' unit plans
- Increased use of project-based approaches
- Creating of groups / teams to coordinate implementation
- Making changes to the Course Curriculum to sustain implementation

In addition to individual interviews, a focus group interview was conducted at each location. The interview protocol focused on each participant's teaching background as a teacher educator and faculty at a Teacher Education Institute (TEI) in Punjab and Sindh. The interviews were transcribed and edited into a profile of each participant. Profiles were coded for common themes and issues for each participant. The profiles were then analyzed for commonalities and differences to distill the findings. The third phase involved sharing the themes in a Focus Group session with the interview participants. They considered the relevance and salience of the themes in light of their own experiences and made recommendations for teachers, and TEI infrastructure. The findings point to common themes which emerged from teaching practices.

The major source of data was the face-to-face interviews which focused on developing an understanding of (a) practice of teacher educators in integration of technology in their teaching (b) the enabling factors, (c) the hindering factors and (d) some concrete examples of successful lessons using technology and problem-based learning. As mentioned above the initial part of the interview was used to collect demographic data as well to become familiar with the teacher educator and to put her/him at ease. The teacher educators were selected in collaboration with the head of each of the institutions selected as research sites. The Heads were requested to identify the required number of teacher educators based on their knowledge of how active they have been in implementing their learning from Intel Teach Essentials Course. However, the teacher educators were informed of their right to be included in the study on a voluntary basis. Each teacher educator was interviewed once for a time period of 45-60 minutes.
Context

Punjab Provincial University of Education

The Punjab University of Education (PPUE) was established in September 2002 by the Government of the Punjab, as a centre of excellence in teacher education and research. The main focus of the University is to promote the discipline of education as a core knowledge area for continually improving and updating teacher education and teaching learning strategies. The University has access to digital library and has three multimedia, and 35 P4 net-worked computers.

The University has two streams of faculty members.
1. Directly recruited by PPUE and have undertaken the Intel Teach Essential course as Master Trainer or participant teachers;
2. Second the faculty recruited by the Punjab government.

The 16 participants for this study were selected from the first category as they had all undergone training in the Intel Teach Essential course. Most were young lecturers, 14 of them were females and only two were males. Twelve of these teacher educators were interviewed individually and four of them were a part of a focus group interview. PPUE has 11 campuses spread all over the Punjab but as already mentioned participants were selected from two campuses in the urban areas and one from the rural area.

Menrah University of Sindh, Jamshedabad

The Menrah University of Sindh, Department of Education opened its doors in 1951 and has since then trained more than 15000 teachers. It offers B.Ed., M.Ed. and M.A. in Education degrees. Five teacher educators were a part of the research participants of this study, three female and two male. One of the male teacher educators had a large experience of 20 years whereas the average experience of the rest of the participants was four years. Intel started its partnership with this institution in 2008 with training of 30 teacher educators. After the success of this training the University signed an MOU with Intel to train 1000 prospective teachers annually. The focus as always has been on integration on technology in their teaching practice. Three teachers were interviewed from this University (one male two female) the rest participated in the focus group interview. All participants were selected by the head of the institution.

Karachi Institute for Teacher Education

This is a teacher education institution built over the last 17 years by catholic sisters from Australia. It has good reputation as a private teacher education facility in Pakistan. It has both a pre service B.Ed. Program and an in-service M.Ed. program where the average enrolment per year is 55 and 30 respectively. It is located on the campus of a high school
which acts as a practice school for the teachers. The students come from all over Pakistan and are not restricted by cast or creed. The degrees offered are recognized by the Karachi University. Four teacher educators were selected from this institution where 3 were males and one female teacher educator with average teaching experience of 12 years. The principal identified the four teacher educators who took part in the study and she ensured that all of them had participated in the Intel program.
Practice of teacher educators in integration of technology in their teaching

Technology Natives (Students) and Technology Migrants (Teacher Educators)
The vast majority of the Teacher Educators said that this course was an opportunity for them to develop technology skills. This was especially true for those teacher educators who were from the rural areas – they said this was their first exposure to technology. However, an interesting aspect that was uncovered in conversations with teacher educators was the difficulty they faced in the integration of technology in the classroom with younger student teachers.

The teacher educators considered themselves to be “technology migrants” who were teaching younger teachers who could be called “technology natives’. These “technology natives” seemed to have developed their own style of using technology making use of “Internet chatting” and playing computer games, and using SMS on their mobile phones. However, these were not the preferred technology innovation propagated by the Intel course. The teacher educators wondered how they could use this knowledge of technology to their advantage particularly when they themselves were not very literate in these forms of technology. Also, despite being technology savvy in some areas these prospective teachers lacked basic skills such as ability to type accurately with some speed.

Another aspect of this power dynamics that teacher educators in the Public sector highlighted was that the key posts in the school or TEI were held by senior teachers who by their very seniority fell in the ranks of “technology migrants”. They were often the first persons to be nominated for these courses. These very same senior teachers were also the decision makers in the school and hence they resisted change. The teacher educators from the government sector were of the view that the Intel course should be available to younger teachers first so that they would be given the opportunity to show evidence of change.

Use of Presentation and Word Processing Software
Presentation and word processing software such as PowerPoint and Microsoft Word were the most common computer programs used by teacher educators in their teaching. They used both these software to “make better use of their time, energy and resources”. The teacher educators stated that the Intel course had helped to make them more organized in their teaching. They now made folders on the computer and saved files related to the topic they taught to students for offline viewing. Apart from this, checklists and rubrics for student teachers were also saved in folders on computers. Most of these teacher educators introduced topics in the class through the use of presentation software such as PowerPoint.

Use of Internet
Almost 99% of the teacher educators stated that the Intel course had given them new approaches and methods to teaching that had helped them to generate, for example:
• ‘more efficient and simplified teaching’
• ‘a positive direction for positive learning’
• a more ‘sophisticated’ way of teaching
• ‘immense changes’ to their teaching

The teacher educators supported their claims by giving some concrete examples of how prospective teachers had used the Internet in developing their lesson plans:

English Teacher, teaching Drama: had used the internet to expand her own knowledge about the topic that she was teaching – different ways the dramas had been made and additional points about them that she might have missed.

Geography Teacher: had used the search engine Google to expand the students knowledge by showing them the formation of earth using multimedia.

English Teacher teaching Literature: had used multimedia and Internet to show his students teaching practices all over the world. This helped them with their lesson plan development. Exposure to some websites also helped them to find out about the different books that were used in the lessons.

From the interviews it is clear that the teacher educators are themselves using technology to enhance and enrich their lesson planning and the way they teach. They also exposed their students to relevant websites and one or two teacher educators have tried to engage the prospective teachers in web quests.

The use of technology is this way is a huge and important step in the right direction. Before teacher educators can use technology in more sophisticated ways they have to take these small steps in the use of technology. However, the big question is how and what processes should be used by Intel teacher trainers in Pakistan to encourage teacher educators to take the next steps in integration of technology in the classroom.

Some Innovative Uses: Pod casts
A teacher educator from a private TEI said that taking inspiration from the Essentials Course, he had tried developing a Pod Cast. He felt that lesson planning required continuous support and help for the prospective teachers. Using pod casts the student teachers could store the lesson on lesson planning on their MP4s or on their mobile phones and keep revisiting it accordingly. He felt that technology was helping students to become self directed learners and the teachers were definitely facilitators instead of knowledge givers.

Use of Non-Internet Based Technology
The teacher educators were aware that technology is not limited to the use of Internet and used other simpler technologies such as CD-ROM, video and television in their classroom. An interesting example is given as how the whole class was “awed” by watching Hamlet on a
A laptop that one of the teacher educators used in the classroom. The English language teacher educators said they tried to show a movie at least twice a year to the students. The science teacher educators mentioned that they used CD-ROM to bring to life three dimensional views of the body systems etc.

Curriculum- Framing Questions
It was heartening to know that most of teacher educators interviewed valued the lesson planning method, exposure to constructivist approaches to learning and the curriculum framing questions taught in the Intel course. They believed that the curriculum framing questions helped in developing higher order thinking in the teachers. Almost all the teacher educators interviewed were using curriculum framing questions not only for the subject of K-12 but also found it useful for teaching topics like measurements and evaluations and school organization and management to student teachers.

Lesson Planning Resources
A teacher educator from a Government TEI in Sindh said that she had started using the Intel “philosophy”, even if the Lesson Plan template that she used was not the same. She was accessing the “Assessing Projects” site on the Intel Education website and adapting checklists, rubrics and also encouraged her student to do so. Another teacher educator from Sindh elaborating on the efficacy of the lesson plan template said, “I was selected for a student exchange program to USA only because I developed a lesson plan based on a sample from ‘Designing Effective Project Site’. I followed the suggested format completely.”
Rural/Urban Divide

The teacher educators for this study were selected from both the urban and rural TEI in both Punjab and Singh to identify the differences in which the two sectors engage with the Intel Course. It was found that in both Sindh and Punjab these differences were very small. This was true as far at teacher educators practice in the Government supported University and the small private TEI. This difference was not noted for actual practicing teachers in the urban and rural areas because here there would certainly be differences in Sindh where the rural sector is more poorly resourced than similar sectors in the Punjab.

However, some commonalities and differences in how teachers in the classroom engaged with integrating technology were discussed by the teacher educators which are outlined below:

- PowerPoint was used by both rural and urban based teachers but former used it with less facility and at a lesser stage of development. For instance the urban based faculty developed lesson power point to show to the class, but the rural based faculty had only developed Lesson introductory presentations.
- Both rural and urban teachers used computer software applications to develop lesson plans but the former took a much longer time to do that as they had less exposure to hands-on use of computers.
- There was much appreciation and awe of the technology in the rural areas particular when exposed to the technology the first time. However, teachers from both areas enjoyed this type of teaching and felt confident in facing the students as according to them the through technology the message deliverance is easier, active and convincing.
- The teacher educators said that the teachers felt empowerment by the use of technology and the urban teachers felt that they could master the technology as long as they had access to computers whereas the teachers in the rural areas did feel a bit intimidated and stated that they not only needed computers but also help from IT teachers in the computer laboratories. The teacher educators felt that the mind set about the use of technology for teaching needed to be changed in the rural areas more than in the urban areas as usage of computer is common in urban areas in both Sindh and Punjab.

It is also possible that the rural/urban divide was not visible as the rural areas selected for both Punjab and Sindh were both close urban centers and were not in remote areas of the provinces.
Follow-up Activities
The teacher educators felt unless strong follow-up activities were undertaken with prospective and in-service teachers the integration of technology would not take root. The researchers also indicated that this was just as much a requirement for teacher educators in TEI as it was for teachers in the field. One 40-hour workshop was not enough to give enough skills to teacher educators to help them integrate technology in the classroom. However, this was an issue that the Intel researchers and teacher trainers were fully aware and a number of follow-up activities are undertaken on a regular basis which included refreshers. But due to time constraints the teacher educators in the TEI found it difficult to find time for refreshers - they are repeatedly rescheduled, postponed and sometimes cancelled altogether. The section on recommendations gives some suggestions for overcoming some of the difficulties of follow-up activities.
Lack of Supportive Infrastructure - Contradictory Messages

One of the greatest challenges associated with integrating technology in instructional practice in the classroom in Pakistan is the lack of supportive infrastructure such as lack of regular electric power - frequent and prolonged load shedding is very common in both urban and rural areas of Pakistan. While regular and constant source of power is a difficulty that TEI in both rural and urban areas face but there appears to be a pre-conceived notion among teacher educators from Government sector about the lack of infrastructure in K-12 Government Schools especially in rural and semi-rural areas. That is the view prevalent among teacher educators that the government schools do not have access computers and hence there is no point in teaching their teachers to integrate technology in their teaching.

However, the data collected from the SEMIS department and the IT Ministry of Sindh show that a large number of Government schools have been provided computers as a result of the Public / Private partnerships and of the Computerization Plan of the Ministry of Education. But these computers have not been used in an optimal manner. In fact the very fact that the prospective teachers do not have the confidence to use the computer technology available that some of these resources are going to waste. It is the classic chicken and egg dilemma - teacher educators think that prospective teachers will not have access to technology so why should they invest their time and effort in teaching teachers to use technology in their classroom. On the other hand teachers do not achieve sufficient confidence in the use of technology due to the limited exposure given to them by teacher educators so that they cannot use the computer technology available to them which then falls into disrepair.

When the country based RTA team visited a number of Government Schools in Sindh they found that many of these computers were still packed up in cartons unused. Some schools that had started to use them did not have technical staff that could maintain and upgrade these computers on a regular basis and hence had fallen into a state of disrepair. On the other hand teachers from the private TEI felt that most of the K-12 schools had the required infrastructure but did not use them effectively by integrating it with all the curricular subjects. The computers were generally used only for the Computer Studies students. At least one teacher educator from the private sector said that she encouraged her student teachers to use technology during practice teaching. She said, “When our student teachers use the computers for integration during practice teaching, it motivates those teachers who are not using it and they begin to use it”.

An interesting finding from the interviews was the contradictory messages received from the teacher educators. Majority of the teacher educators in Sindh stated that they had no problems with technology as the TEI where they worked was well equipped with the latest infrastructure, had proper connectivity and a generator to cope up with the challenges of load shedding. The teacher educators stated that they could implement this course and
integrate it into their scheme of studies effectively. But they found it very challenging to convince the student teachers about the effectiveness of this course. The main reason for this was the lack of Infrastructure in the K-12 schools. One teacher educator stated:

“We do not face many challenges as we have the required infrastructure but the challenge is in convincing Student Teachers about the effectiveness of this program as they know that when they go to the K-12 classroom, they will not have the infrastructure conducive for implementing these Units.”

Integrating Technology in the Teacher Education Syllabus
Policy makers and ministry officials face many important decisions as they cope with sweeping global trends. But none is more important to economic and social development than those they make in education policy. By examining the relationships among reforms in policy, teacher training, pedagogy, curriculum, assessment, ICT, and school organization, and by aligning these changes with important economic and social goals, policy makers can create 21st century schools and nurture the development of 21st century students.

Majority of the Teacher educators interviewed as a part of this study in the Punjab and Sindh had mapped their existing B. Ed. and M. Ed. curriculum and integrated modules from the Essentials Course. Some of these TEI have not adhered to the requirements laid down by the Country based team as to the non negotiable modules of the Course. They are still using this course to teach Technology during the Computer application period the Country Based RTA team needs to work with these TEIs to support them in this process further. There is room for exploring more collaboration with relevant curriculum wings for allocation of more time to the teaching of Intel Modules.

All of the Teacher Educators interviewed said that a collaborative group had been formed to formally integrate the Essential Course modules into their scheme of studies. One of the TEI from the private sector said that they could not formally make changes to the B. Ed. and M.Ed. curriculum but they made the changes during implementation. They stated that they did not use the Essentials Course as a separate course of study because the student teachers would not take it seriously but they had started using these concepts in teaching Mathematics, Economics, General Studies, Measurements and Evaluation. The computer teacher was kept in the loop constantly and he supported the team implementing the modules by upgrading all the software, computer and Multimedia equipment. He was also available to trouble shoot when teacher educators ran into difficulties.

Some of the Teacher Educators felt that when the TEI were planning on integrating the Essentials Course to the scheme of studies, it was imperative that the country based RTA team should work with them. The integration should be planned collaboratively so that the recommendations could be included and the plan would be more meaningful. They also highlighted the need to have more frequent refresher courses for the Intel course. One teacher educator mentioned that after undertaking the Intel course when they go back to the schools they get busy with their work and many months pass by, when the refresher
course finally happens. They then find it difficult to recall and relate to what happened during the training sessions. Although these monthly follow ups are built into the academic calendar but it they often do not take place due to the many unprecedented holidays and strikes which take up so many days of academic work that there is no time left for these refresher courses.

**Policy level changes**

One of the teacher educator interviewed highlighted the importance of sustaining the impact of this course by working closely with the Ministry of Education and the Curriculum Wing to ensure that policy level changes are made to accommodate the use of such methods in the classroom. Alignment of curriculum, textbooks and assessments methods in classroom teaching necessary for effective implementation of the Intel course are important and necessary. Though the Intel Education Initiative has been working with the MOE to enable these policy level changes and it is heartening to note that a new Standards Based Curriculum is being designed with support from distinguished people from the Academia and the Curriculum Wing. Along with these standards, integration of IT with curricular subjects will also be a part and parcel of the new curriculum.

Other Teacher Educators who were interviewed also suggested that this new concept of integrating ICTs in teaching seems to be taking strong roots especially in institutions where the Essentials Course Pre Service Modules were being integrated into the Scheme of studies. Hence, it appears that at least in government institutions Intel course works better if accompanied by formal integration in B.Ed. curriculum.

Some of the Teacher Educators felt that when the TEI were planning on integrating the Essentials Course to the scheme of studies, it was imperative that the country based RTA teem should sit with them and this planning should be done together so that the recommendations could be included and the plan would be more meaningful. They also highlighted the need to have more frequent Refreshers. One Teacher Educator mentioned that they get busy with their work and many months pass by, when the Refresher finally happens, they find it difficult to recall and relate to what happened during trainings. Although these monthly follow ups are built into the academic Calendar but it rarely takes place due to the many unprecedented holidays and strikes which take up so many days of academic work that there is no time left for Refreshers.

**Lack of Practice Time for New Methodologies**

When the teacher educators were asked whether these student teachers got a chance to undertake Problem-based-learning (PBL) lessons to pupils in the school classroom during practice teaching? Almost all of them responded that it was not possible to teach these lessons during practice teaching because these lessons required a large amount of time to implement in the classroom. The teachers participating in the Intel course did not have enough time during practice teaching time. However, the teacher educators tried to role model these methodologies while teaching and the student teachers were expected to use
part of their unit plans during the micro teaching phase. The student teachers were also encouraged to design these lesson plans in collaborative groups which were then presented to all groups so that the whole cohort attending the Intel course were able to view many different lesson plans which they could use once they went back to their teaching.

Teacher educators interviewed from both Public/ Private TEIs felt that Project Based learning could take place successfully in subjects such as Social Studies and these teachers were already carrying out implementation of Project Based Learning. It is also interesting to note here that almost all the subject teachers teaching grammar found PBL least effective or applicable to their subjects.

Some of the teacher educators were acutely aware that they have to “walk their talk” and demonstrate the teaching methods to the teachers. One of the teacher educators in Sindh said, “The way I teach is the way students should teach in schools, I have to demonstrate each and every method so that they know how it should be done”.

**Improvement in classroom management**

The teacher educators felt that they by using computers to access materials for their lesson planning, obtaining ideas on teaching and managing the classroom they themselves had become better managers of their own classrooms. Looking at them a role model effect has been created, one teacher educator said, “Yes it has made my teaching simpler and effective. Students’ responses are better and they want to learn the new technology - it attracts everybody”.

The teachers also felt that this course had helped to make them organized; they now made folders and saved files related to the topic they taught to students for offline viewing. Apart from this checklists and rubrics for student teachers were also saved in folders. Most of these teacher educators introduced topics in the class through the use of technology such as a power point presentation or relevant websites; they also engaged their students in web quests.

**Student numbers and background**

A factor that influences the use of technology in the classroom is the number of prospective teachers enrolled. Generally, in government institutions the numbers enrolled increase every year but there is no concomitant increase in technology resources. For, instance in PPUE enrolment of prospective teachers increased by almost 20% but there was no concomitant increase in the number of computers available them in the computer laboratory.
Deciding how to integrate the Essentials Course into the existing qualification can be challenging for TEIs, particularly when coupled with an overcrowded curriculum, complex accreditation requirements for new units and the need to ensure access to sufficient computers to conduct the course. The different approaches adopted were based on the needs and contexts of each institution, the length and nature of their qualification and the specific teaching areas of the Teacher Educators delivering the course.

The recommendations from the findings are in three important areas, (a) Suggested change/ modification in the Intel Course, (b) Follow-up activities and (b) Policy initiatives.

Suggested changes/modifications in the Intel Course and Delivery
The findings of the study indicates that teacher educators do not have time to practice the skills taught to the prospective teachers in the real classroom situation during the Essentials course. The study has also shown that due to lack of upkeep and maintenance of the computers and other technology falls into disrepair and teachers in the schools find it difficult to use the equipment which leads to de-motivation. Some modification and changes are suggested to the Intel Teach course:

- **Mandate at least a small amount of time to be spent in a “collaborative” TEI or school implementing a few key ideas of Intel course in the actual classroom with prospective teachers.** For instance, if Intel teacher trainers are training teacher educators in a government TEI, at least half a day (4-hours) can be spent by the teacher educators in the class teaching prospective teachers under the guidance of the Intel trainers. This will give hands-on practice to teacher educators in how to encourage the integration of technology in teaching. This time could be increased to as much as two half days. It might be better to do less with practice in the classroom than more without hands-on exposure.

- **At this point Intel is used to a centralized approach to training teacher educators and teachers.** Perhaps some of the training could be undertaken through the **cluster based mentoring model.** Here a cluster of TEI or schools is selected as a unit with one group of teacher educators under the supervision of Intel teacher trainers to develop a cluster of schools together.

- **Intel teacher trainers develop a cadre of volunteer “teacher trainers” who can become Intel Ambassadors in helping to provide the extra human resource needed to ensure that some hands-on practice is provided.** The Intel Ambassadors would be chosen from among teachers and teacher educators who have shown exemplary practice of technology integration in their own practice. For instance, if an Intel trainer is undertaking a workshop for 20 teacher educators, then a group of 3-4 Intel Ambassadors can offer support for the 4-hour practicum as suggested above.
• Encourage teacher educators in TEI to **follow up a small percentage of promising** prospective teachers when they start working in the school to support their efforts to implement Intel course.

• To make **software management and trouble shooting** a part of their module. Much time is wasted because of software and hardware problems so that motivation is diminished and slowly use of technology stops all together.

• **Use K-12 Curriculum to give sample lessons plans.** Use examples in PBL and other units that arise from the K-12 curriculum so that teachers can implement their planned portfolios. Often the teachers were given an example or sample lesson plans which were not a part of the K-12 curriculum, such as English Literature. Adapting these examples to their own subject was something that majority of the teachers found hard to do.

• **Encourage the use of Non-Internet resources where connectivity is a problem.** The Essentials Course is conducted by Intel Teacher Trainers to teacher educators in the University and college setting. Invariably, these institutions are better resourced than the schools in which the prospective teachers will eventually go to work. One strong recommendation that is arising out of the findings is that Intel might need to keep in mind the facilities available in K-12 schools in teaching some of the units so that teacher educators when teaching can help develop materials available in all schools. For instance it is clear that connectivity and access to internet is an area where there is less access even when there are computers available. Hence, prospective teachers can be encouraged to use the non-internet based resources or some of the key internet based resources might be made available to schools on CDs.

**Follow-up Activities**

Research literature is full of examples of very good teacher professional development initiatives that did not give the results expected as the follow-up after the input was not strong. This is a refrain that can be heard from all 21 teacher educators interviewed. With resource constraint follow-up of all teacher educators trained by Intel or the prospective teachers who go in the field is not possible. However, a few recommendations are made to help this process:

• When the dates for courses are negotiated dates for refresher course should also be negotiated at least after six months. These should be non-negotiable.

• Refreshers should include a more advanced version of software management and trouble shooting component included in the Intel course.

• Use the “Buddy System” and attach 2-3 three teachers from the same institutions into a group to work together. During the refreshers to revisit the Buddy System and see how it has worked.

• Make an Intel association for teachers and teacher educators to conduct needs based workshops by themselves. Similar initiatives undertaken by science and mathematics teachers in Sindh have worked very well.

• Make online community to maximally use technology to enhance collaboration and interaction so that best practices can be shared.
• Work with a small group of TEI or schools until a “saturation” point is reached in training all teacher educators or teachers including hands-on practice in the classroom.

Policy Initiatives

One of the teacher educator interviewed highlighted the importance of sustaining the impact of this course by working closely with the MOE and the curriculum wing to ensure that policy level changes are made to accommodate the use of such methods in the classroom.

• **Integration of Intel course into the Teacher Education Curriculum.** Intel could and should encourage Ministry of Education to integrate Intel course modules into their scheme studies for Teacher Educators to implement it in a robust manner. For instance in Sindh, because it is a part of the scheme of studies in the TEI, teacher educators have been able to make it a part of the curriculum. This has offered incentive to the Teacher Educators to use Intel course in their teaching. However, such an ownership could not be developed at the private TEI affiliated to the Karachi University as there is no such memorandum of understanding with the KU.

• **Ensuring Understanding of the Intel Programme Goals.** Intel should be proactive in ensuring that the Ministry of Education (MOE) and all institutions that take part in its programs understand their objectives fully. Most institutions even now consider Intel course from the perspective of computer use rather than technology integration in teaching. The first two modules of the course should be a non-negotiable part of all teacher training programs as it introduces the core strands of the course.

• Often TEI, especially those in the government sector see this program as relevant only to computer teachers and they are more engaged with the program as compared with the subject teachers. While this is a good start, it gives signals that computer use is only for computer teachers and not for all subject teachers as envisioned by the Intel course. The utilization of the Intel course could be greatly strengthened if all subject teachers were encouraged to use technology as they understand the pedagogy of their subjects better.

• It was also pointed out that Intel Education Initiative and the country based RTA should share the findings of the impact studies which take place globally or share the link with the TEIs as this would help them to understand the facilitating and hindering factors in the implementation and integration of this course at TEIs. They also highlighted the need for world wide interaction and emphasized the need to form an online community of Teacher Educators where they could share ideas and learn from each other more effectively.

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The changes which are taking place at the TEIs are slow to happen, the institutionalization process cannot happen overnight but teacher educators and teachers have started thinking in new ways of using technology.
References


Summary of the Pakistan Evaluation Report (October 2007). Deakin University Faculty of Education.

Appendix A

Semi-Structured Interview Guide for Teacher Educators

Directions for the Interviewer:
The interviewer will find an empty classroom or office to take the interview. In case of interviewees of the opposite gender care should be taken in selecting a suitable place for conducting the interview. Care should also be taken to dress appropriately taking in consideration the culture of the college/university or institution. It is preferable that the fan is not switched on to improve the quality of the audio-recording. Ensure that you carry extra tapes and batteries for the tape recorder. Also do not forget to check in the beginning and in the middle of the interview that the recorder is actually recording the interview. A bit of practice ahead of time will be helpful.

The following guidelines will ensure a good interview:

- Spend the first few minutes putting the interviewee at ease, at this time it might be appropriate to ask the demographic questions
- Listen respectfully and do not ask leading questions nor try to elicit required responses to questions.
- If you do not understand the response given feel free to ask for further elaboration or clarification.
- Always ask examples when teacher educators claim using specific strategies in their classroom as way of illustrating the example.
- Give encouraging signs while the interviewee is responding to signal that you understand and want her/him to continue.
- At the end of the interview thank the participant and leave your contact information with the interviewee.
Semi-Structured Interview Guide

Date: ........................................  Location: ..................................Code ............

Name: ..........................................................Gender: .................................

Designation.......................................................... Age .................

Institution........................................................................................................

Experience of Teaching (total): ...............Experience of teaching in this institution: ...........

Which subjects do you teach: ........................................................................

Academic Qualification (MA, MSc or other): .............................................

Professional Qualification (B.Ed., M.Ed. or other): .....................................

1. How have you used this course to enrich your teaching?
2. Describe a lesson in which you have used technology to enrich your teaching?
3. What are some of the technological innovations (internet, CD-ROMs, animation, etc) that you have used most often in your classrooms?
4. How do you use this course in teaching lesson planning to student teachers? Give examples.
5. Have you engaged in project based teaching in your class? Could you illustrate it with an example?
6. How do you use learning from this course to enhance higher order thinking in your classroom? Give examples.
7. Have you used any of the materials that you developed in your course in your classroom?
8. Have you made any changes or addition to the teacher education curriculum to accommodate the use of technology in your teaching?
9. How has this course made your teaching more effective?
10. Have you formed a group or team to coordinate the implementation of the course in your teaching?
11. What are the supporting mechanisms in place to help you to integrate technology in your classroom?
12. What are the challenges you face in using and integrating technology in your classroom?
13. Has there been a shift in your style of teaching after taking this course?
14. Please feel free to share with me any thing that you want and I might not have asked you so far.

    Thank you for granting me this interview
Appendix B

Numbers of Teachers trained
(Approximate)

Punjab University of Education

UOE Campus

1. University of Education Bank Road Campus, Lahore (110 faculty members)
2. The University of Education Township campus, Lahore, (50 faculty members)
3. The University of Education Lower Mall, Lahore 30
4. The University of Education Faisalabad 30
5. The University of Education Johrabad 30
6. The University of Education Okara 30
7. The University of Education Multan 30
8. The University of Education Vehari 30
9. The University of Education Attock 30
10. The University Of Education- DG Khan 30

Then there are 33 campuses called Government College for Elementary teachers. (GCET)

Enrollments (almost fixed every year) are 4600 from UE campuses and 4200 from GCET campuses.

Approx. 460 student teachers from each from UOE

120 student teachers from each GCET
Menrah University of Sindh, Jamshedpur, Sindh

30 Faculty Members

550 Student teachers

Karachi Institute of Teacher Education, Karachi

10 faculty Members

41 student teachers