

## Place of a Realistic Teacher Education Pedagogy in an ICT-Supported Learning Environment in Distance Teacher Education in Uganda

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**Abstract** · This article is based on a study undertaken to examine the impact of introducing a realistic teacher education pedagogy (RTEP) oriented learning environment supported by ICT on distance teacher education in Uganda. It gives an overview of the quality, quantity and training of teachers in primary and secondary schools in the country after which it positions distance learning in teacher education. Using the evidence gathered, it suggests solutions to challenges facing distance teacher education in the country. It is argued that the solutions may be relevant to distance teacher education worldwide.

**Keywords** · Realistic teacher education pedagogy · ICT · Learning environment

*La Place d'une Réaliste Education Pédagogique de l'Enseignant dans un Environnement d'Etude par Correspondance dans l'Education de l'Enseignant Supporté par la Technologie et Communication Informatiques (TCI) Informatique en Uganda · Résumé · Cet article est basé sur une étude conçue pour examiner l'impact d'avoir introduit une Réaliste Education Pédagogique de l'Enseignant (REPE) dans un environnement d'étude supportée par la Technologie and Communication Informatiques (TCI), sur l'étude par correspondance dans l'éducation pédagogique en Ouganda. Ceci donne un sommaire de la qualité, quantité et formation des enseignants d'écoles primaires et secondaires dans le pays, et qui d'après tout positionne les études par correspondance dans l'éducation pédagogique. Usant l'évidence collectée, cet article suggère les solutions aux défis faisant face à l'étude par correspondance dans l'éducation pédagogique dans le pays. Il a été montrée que ces solutions peuvent être importantes à l'étude par correspondance dans l'éducation pédagogique partout au monde. Mots Clé · Réaliste éducation pédagogique de l'enseignant · TCI · l'Environnement d'étude*

### Introduction

To underscore the importance of adopting a RTEP oriented learning environment supported by ICT in distance education, it is necessary to understand the status of teachers, teacher education and distance education in Uganda.

### Status of Primary and Secondary School Teachers in Uganda

Analysis of the current status of teachers in Uganda draws attention to both quantitative and qualitative elements in relation to qualifications, numbers and attrition rates. Table 1 and 2 give an

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overview of the proportion of teachers with their qualification in primary and secondary schools from 2000 to 2004.

**Table 1: Primary School Teachers' Qualifications (2000 -2004)**

Qualification	Year 2000		Year 2001		Year 2002		Year 2003		Year 2004	
	Total	%	Total	%	Total	%	Total	%	Total	%
At least Grade IV <sup>a</sup>	11779	10.7	14686	12	17261	12	19071	14.1	22066	15.8
Grade III	71051	64.4	80011	63	86630	62	89792	66.3	93831	67.4
Licensed <sup>b</sup>	17579	15.9	18043	14	24072	17	25879	19.1	22756	16.3
Others <sup>c</sup>	9957	9.0	14293	11	11521	8	660	0.5	661	0.5
<b>Total</b>	<b>110366</b>	<b>100</b>	<b>127038</b>	<b>100</b>	<b>139484</b>	<b>100</b>	<b>135402</b>	<b>100</b>	<b>139314</b>	<b>100</b>

<sup>a</sup> At Least Grade IV: Includes All Graduate, Diploma, Grade V, and Grade IV.

<sup>b</sup> These are untrained teachers recommended by the Ministry of education to teach.

<sup>c</sup> Others: Include all grade II teachers and others recorded as Not Stated.

Source: Education Management and Information System (2004)

**Table 2: Secondary School Teachers' Qualifications (2000 -2004)**

Qualification	Year 2000		Year 2001		Year 2002		Year 2003		Year 2004	
	Total	%	Total	%	Total	%	Total	%	Total	%
Graduate	8074	27	7905	26	10100	28	11341	33	12040	33
Diploma	11376	37	11998	39	12124	33	15372	45	15277	42
Grade V	4734	16	4557	15	7423	20	3481	10	3269	9
Licensed <sup>a</sup>	3502	12	1942	6	3438	9	2217	7	1722	5
Others <sup>b</sup>	2698	9	4023	13	3368	9	1522	4	4189	11
<b>Total</b>	<b>30384</b>	<b>100</b>	<b>30425</b>	<b>100</b>	<b>36453</b>	<b>100</b>	<b>33933</b>	<b>100</b>	<b>36497</b>	<b>100</b>

<sup>a</sup> These are untrained teachers recommended by the Ministry of education to teach.

<sup>b</sup> Others: Include all grade II teachers and others recorded as Not Stated.

Source: Education Management and Information System (2004)

The minimum qualification for teaching in primary school is a Grade III certificate, while teaching in ordinary level secondary school is a Grade V diploma and for teaching in advanced level secondary school it is a Bachelors degree in Education. As can be derived from both tables, more than two thirds of the teachers have the minimum qualifications required to teach in the schools where they are teaching and this has been improving with each year. However, two concerns are raised in relation to the data in the two tables. First, there a significant percentage of teachers still lacks the minimal qualifications. Second, there are also teachers whose qualifications are not suited for the school level where they are teaching. This becomes especially clear when we study the detailed data in Table 3.

**Table 3: Distribution of Teachers by Qualification (2002 and 2004)**

Year	Year 2002				Year 2004 National			
	Primary		Secondary		Secondary			
Level	N	%	N	%	N	%	N	%
Diploma in Primary Education	10284	7.4	12341	33.2	15281	41.0		
Grade II Teacher	3118	2.2	48	0.1	70	0.2		
Grade III Teacher	86630	62.1	96	0.3	159	0.4		
Grade IV Teacher	939	0.7	100	0.3	571	1.5		
Grade V Teacher	5147	3.7	7513	20.2	3269	8.8		
Graduate Teacher	891	0.6	10400	27.9	12042	32.3		
Licensed Teacher/Untrained <sup>a</sup>	24072	17.3	3512	9.4	1722	4.6		
Not Stated <sup>b</sup>	8403	6.0	3217	8.6	4199	11.3		
<b>TOTAL</b>	<b>139484</b>	<b>100</b>	<b>37227</b>	<b>100</b>	<b>37313</b>	<b>100</b>		

<sup>a</sup> These are untrained teachers recommended by the Ministry of education to teach.

<sup>b</sup> Not Stated: unqualified and not recognised by the Ministry of education.

Source: Education Management and Information System (2004) and (Ministry of education and sports, 2002)

In the primary school sector slightly more than a third of the teachers should not be teaching at this level or teaching at all as is the case with the 17.3% untrained teachers. In the secondary school sector more than half of the teachers teaching in secondary schools are not qualified to do so, since Grade II and IV teachers were phased out of the education. Teachers with a diploma in primary education are teaching in secondary schools and those with Grade V–diploma in secondary education are also teaching in primary schools.

Apart from the teacher qualifications, the teacher-student ratio is a major concern. Considering the earlier observation about a persistent percentage of under qualified teachers, this puts forward challenges for both in-service and pre-service teacher education. Table 4 summarizes data to calculate teacher student ratios, both at primary and secondary school level.

**Table 4: Teacher- pupil Ratio (1995 – 2004)**

Primary School	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total pupils N	2636409	3068626	5303564	5806385	6288239	6559013	6900916	7354153	7633314	7377292
Schools N	8531	8531	8600	9916	10597	11578	13219	13332	13353	13407
Teachers N	76111	81564	89247	99237	109733	110366	127038	139484	145587	141,461
Teacher pupil ratio	1:35	1:38	1:59	1:59	1:57	1:59	1:54	1:53	1:52	1:50
Secondary School	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total Students N	256259	256731	445676	265676	258263	518931	539786	655951	683609	697507
Total Schools N	619	619	621	837	1633	1892	2400	2198	2863	2969
Total Teachers N	14447	15783	15995	16206	23295	30384	30425	37227	38549	37313
Teacher student ratio	1:18	1:16	1:28	1:16	1:11	1:17	1:18	1:18	1:18	1:19

Source: Education Management and Information System (2004)

The introduction of Universal Primary Education (UPE) in 1997 negatively affected the teacher student ratios in primary schools. We can observe an increase from 1:38 in 1997 to 1:50 in 2004. At secondary school level, the teacher/student ratio remains rather stable. But the table also illustrates the pressure on teacher education to deliver growing numbers of teachers to cope with the growing numbers of students in the school system.

Linking the information from Tables 1, 2 and 4, we have to consider in the teacher student ratio also the number of unqualified or lower qualified teachers that have to cope with growing numbers of primary school children. Although the teacher student ratio at secondary school level looks much better as compared to primary school level, there is the question of the impact of Universal Secondary Education introduced in 2007. The growing number of teachers entering the profession, and based on the right qualifications, looks hopeful. Statistics of the Education for All (EFA) Assessment (2000) indicate that up to 75% of teachers now have sufficient qualifications. However, one should consider the level of attrition in this context (Table 5).

**Table 5: Teacher Attrition**

Year	% New Teachers			% Teacher leaving the system		
	Trained	Untrained	Total	Trained	Untrained	Total
1986	11	20	31	10	15	25
1989	9	17	26	5	9	14
1991	8	13	21	3	6	9
1993	9	11	20	10	10	20
1995	7	4	11	2	4	6
1998	67	33	14	38	<sup>a</sup>	38

<sup>a</sup> The exact % of untrained teachers leaving the profession for this year is missing.

Source: EFA Assessment (2000)

Table 5 shows the number of new teachers entering both primary and secondary education and the percentage leaving the teaching profession. The data indicates that teacher attrition is a problem and that it affects both trained and untrained teachers. Although the net number of teachers increases yearly, it is evident that problematic teacher student ratios also include shifting number of teachers entering and leaving the profession.

## Teacher Education

Teacher education in Uganda reflects a variety of approaches to becoming a qualified teacher. The lowest teacher qualification level is a grade III certificate. These candidates obtained two credits at ordinary level in order to enrol in a primary teachers' college. The majority of teacher education institutions in Uganda focus on teachers at this level (cf. Table 6). If these teachers were to study full-time, they would have to leave their teaching positions for about 2 to 5 years, which poses a challenge to their upgrading.

**Table 6: Relationship between Entry Requirements and Teacher Education Qualifications**

Qualification obtained	<b>Grade III certificate</b> (2 years at a Primary teachers' College)	<b>Diploma in primary education</b> (2 years at a Grade V teacher education institute of at University)	<b>Diploma in secondary education</b> (2 years at a Grade V teacher education institute of at University)	<b>Bachelors degree in Primary education</b> (3 years at a university)	<b>Bachelors degree in Secondary education</b> (3 years at a university)	<b>Post graduate diploma in education</b> (1 year at university)
Entry requirements						
Institutions offering*	45	10 – NTCs + 19 Universities		19 (6 government & 13 private)		
Ordinary level certificate						
A-level certificate						
Grade III certificate						
Diploma in primary education						
Diploma in secondary education						
Mature Age Entry						
Bachelors degree						

\*Some universities offer teacher education in view of primary, secondary or both educational levels.

## Enrolment and Graduation of Teachers

Only incomplete statistics exist regarding the enrolment and graduation of teachers in Uganda. Table 7 summarizes the available data.

**Table 7: Teacher Enrolment and Graduates (1989- 2004)**

Year	1989	1991	1993	1994	1995	1996	1997	1998	2004
Teacher training colleges (Enrolment) – N= 45	15166	14305	17541	18512	22703	13339	26418	47563	7061
National Teacher Colleges (Enrolment) – N=10	3008	4534	5703	6017	8044	7955	8760	11130	16,170
National Teacher Colleges (Graduates) – N=10									6,778
Makerere university B. Educ (Kyambogo) - Enrolment		399		263	326	703		784	
Makerere university B. Educ (Kyambogo) -Graduates	220	189	58		70	4	94	62	
Makerere university B. Educ (BSc & BA) - Enrolment	487	775	901	862	820	1509	941	1167	
Makerere university B. Educ (BSc & BA) - Graduates	149	168	305	276	232	256	312	326	

Source: Uganda Bureau Statistics (2005)

The data is organized according to the types of institutions where the teacher education qualifications can be obtained. There is an increasing trend in the number of teachers trained from the different institutions over the years. Considering the figures for Makerere University and Kyambogo University, the graduates are far less than the enrolment three years before and yet it is

the graduates' numbers that give us an indication of the number of teachers that are ready for deployment. Is it possible that once students are admitted in the university they change courses or dropout, thus explaining the discrepancy between the numbers of those enrolled in education and the actual number of graduates? Again the trend of this number is varying. Of concern is also the possibility that a number of students on BED are already practicing teachers so they would not be an addition on the education system.

### ***Teacher Education Pedagogy in Uganda***

In this section we discuss the dominant pedagogical approach adopted in the Uganda teacher education context. A critical issue is the relationship between introduction into the theoretical knowledge base and development of the practical knowledge and skills necessary to become a proficient teacher. This practical knowledge goes beyond practices about navigating the classroom since it also highlights the complexities of interactive teaching and thinking in action (Munby, Russell and Martin, 2001). Practical knowledge both focuses on subject matter, students and student learning and understanding (Meijer, 1999). Although teacher education institutions aim at equipping student teachers with this theoretical and practical knowledge base, the dominant teacher education pedagogy questions the potential to attain these objectives.

In Uganda, a typical student teacher follows a curriculum consisting of (1) a subject matter domain (specific subjects the future teacher will teach), (2) foundations of education (history of education, sociology of education, philosophy of education, economics of education and comparative education) (3) professional studies (education psychology, curriculum studies, subject methods) and (4) the practicum (school practice) (Aguti, 2003). In view of the four curriculum domains, the lecturer or tutor defines the knowledge, skills and competencies to become a teacher. The main pedagogic approach is based on whole classroom teaching during which specialist lecturers or tutors teach the different subjects. School practice takes place at least once a year. During school practice, a student teacher is expected to prepare a scheme of work and lesson plans in order to teach in live classrooms. Some of these are supervised by the lecturer or tutor from the institution where they are training. Student teachers also receive some responsibilities to organise extra school activities, such as addressing the school assembly, supervision and individual child study activities. Student teachers are evaluated separately in view of the four curriculum areas.

This description of this dominant Uganda teacher education pedagogy fits into the scientific or mechanic view of Hoban (2002). According to this view courses are taught independent of one another. This is also referred to as technical rationality (Korthagen, 2005; Korthagen, 2001a). This approach equips student teachers with the necessary theoretical base, but does not guarantee the transfer from theory to practice (Korthagen, 2005; Korthagen, 2001a; Hoban, 2002). Due to the disconnected nature of developing the theoretical base, there is the danger that this theory is presented too early or too late in view of becoming relevant for teaching practice (Korthagen, 2001b). This, more often than not, can lead to misinterpretation of the complexity of the school as a system (Hoban, 2002). In the end, this teacher education pedagogy will result in a disconnected personal base to direct the future teaching practice. Theoretical knowledge is considered to be linked to rational, logical, analytical thinking, whereas the practical knowledge is rather based on gestalts, personal conglomerates of needs, concerns, values, meanings, preferences, feelings and behavioural tendencies (Korthagen, 2001b).

The technical rationality approach stresses a prescriptive approach towards teaching by adopting a particular, prerequisite set of skills, disconnected from the founding theory and or research base (Munby et al., 2001). This technical rationality teacher education pedagogy can result into a conception of teaching as a craft - a repertoire of skills or competencies that are accrued over time and are the result of developing a set of technical skills, based on a set of goals and lesson plans (Hoban, 2002). In addition, "teaching as a craft" starts from a teacher centred point of view that puts the teaching subject at the core of the teaching activity and not the learner. Knowledge and skills are passed on without student teachers knowing what the relevance of this set of knowledge might be (Phillion and Connelly, 2004).

The former paragraphs help us to approach the dominant teacher education pedagogy in Uganda in a critical way. As previously mentioned the technical rationality approach forms the basis for Uganda's dominant teacher education pedagogy where theory and practice are not developed in an integrated way. Pulling together the information of the former paragraphs, the issue of upgrading teacher education in Uganda is important from a quantitative and qualitative perspective. Key questions can be put forward as to the quality of current teacher education that embraces to a dominant extent the technical rationality approach.

In the context of this study, different approaches are presented that help to answer both elements of the problem. To meet the quantitative demands, distance education is put forward. In addition Information and Communication technologies (ICT) are presented as additional elements to cope with the quantitative dimension in the teacher education problem. To meet the qualitative critiques, different teacher education pedagogy is suggested. ICT is in this context also expected to support this teacher education pedagogy.

## **Distance Teacher Education to Improve the Quantity of Teachers**

### **Demand for Distance Teacher Education**

In Uganda, there is a gradual increase in the number of students enrolled in distance education courses and also an increase in the number of institutions offering distance education (Ouma, 2003). Distance education is expected to increase the number of student teachers in initial teacher education and in in-service teacher education. As to the latter, it is expected that this might solve the challenge of lower qualified teachers to upgrade their qualifications without having to leave the school system. Other teachers could opt for distance teacher education in view of further career development like attaining extra qualifications that guarantee higher wages, pension, prestige and/or promotion, or to meet the needs to develop up-to-date knowledge, skills and competences.

### **Format of Distance Teacher Education**

To understand the general format of distance teacher education in Uganda, it is helpful to have a closer look at the mission statements of some typical teacher education institutions (that have offered distance teacher education extensively), characteristics of the current student target population and the nature of the delivery format in distance education approaches.

The goal of the Department of Distance Education in Makerere University is to offer a wide variety of educational programmes for adult students, by adopting a flexible multi-media approach. The department promotes open access to lifelong education, in particular at the level of higher education (Institute of Adult and Continuing education, 2005). At the Uganda Martyrs University (UMU) the mission of the Centre for Extra-mural Studies and Distance Learning is to make available a wide range of programmes and courses geared towards the needs of the community, and as such beyond the boundaries of the university (Uganda Martyrs University, 2005). The External Diploma in Primary Education launched in April 1999 at the then Institute of Teacher Education (ITEK), now Kyambogo University to upgrade Grade III teachers to Diploma level uses distance education. Among the aims of the program according to Aguti (2002) is to provide opportunity to eligible and interested teachers who cannot pursue full-time courses in the colleges/institutions or Universities. Also to develop a more flexible mode of education that caters for a variety of needs, changing circumstances and learning requirements of the teachers. The mission of Ndejje University is tailored to suit student needs for the new millennium. At governmental level, the Teacher Development Management systems project (TDMS) reformed in-service training for primary teachers by promoting distance education (Ministry of Education and Sports, 2003). This followed the some earlier efforts under MITEP (Mubende Teacher Education Programme) and NITEP (Northern Uganda Teacher Education Programme) which offered in-service training to teachers.

The examples cited clearly indicate that increasing flexibility and access to teacher education is a shared objective of these initiatives. Distance teacher education in Uganda targets both pre and in service teachers at primary and secondary school level teachers working towards attaining a

diploma or a degree level. For example, the Teacher Development Management Systems project (TDMS) is set up in primary teacher education colleges targeting untrained/licensed teachers in primary schools. Distance teacher education at universities targets both pre and in-service teachers.

The delivery format of distance teacher education in Uganda is predominately through printed modules enriched with traditional face to face sessions during holiday periods (Institute of Adult and Continuing education, 2005). In the TDMS project, the delivery of distance education is in addition enriched with peer group meetings, study visits, and short courses at the coordinating centres during the holidays (Ministry of Education and Sports, 2003). The face to face sessions are either offered at the institution (Makerere University and Ndejje) or in study centres (Kyambogo University and Uganda Martyrs University). These study centres are geographically closer to where student teachers live. In the case of Makerere University the study centres are expected to encourage group discussions and the dissemination of information and news. Contrary to expectations about the role of study centres, however, no additional student support, such as counselling and library services are available. Most of such services are only available at the central level (Aguti, 1999; Aguti, 2003). In light of the above description, the current distance education is not very flexible. In addition, the current approaches reflect a rather limited set of instructional approaches that hardly stimulate a variety of perceptions of student teachers about instructional approaches.

### **Instructional Approaches in Distance Teacher Education in Uganda**

Distance teacher education needs to follow sound instructional approaches to achieve its purpose. The theoretical basis on which instructional models are based affects not only the way in which information is communicated to the student, but also the way in which the student makes sense and constructs new knowledge from the information which is presented (Sherry, 1996). Instructional approaches can be viewed from different perspectives. Regardless of which perspective, they put into consideration the interaction of the student, the instructor and the learning environment. Considering the unavailability of literature, the findings of this section are based on a comprehensive study of distance teacher education in Uganda (Aguti, 2003). These findings are based on responses of students, prospective students, tutors, managers and policy makers reported in the study. The respondents were from five different distance teacher education programs run by different institutions. The respondents highlighted the strength and weakness of distance education.

In general the instruction in distance teacher education involves use of printed modules, face to face sessions, study group meetings and assignments. In relation to instruction is also communication between actors, planning and coordination of the program, access to reference resources and the use of ICT. They are applauded to have their strength but also are said to have pertinent weaknesses as will be summarised below.

The curriculum is criticized for being irrelevant, theoretical (little emphasis on skills needed in the field and lack of practical application of what is learnt) and having inadequate coverage (there is specialising in the training, yet in the field primary teachers are expected to teach all subjects and also heavy workload for the available time). There seems to be a contradiction in this finding and this could have been made clearer if the relevant and lacking skills had been mentioned.

Print modules that are used are said to be user friendly and legible. However, respondents are concerned about the slow pace of their production, poor provision and at times unavailability. In addition, the quality of some is queried. There is a fear of plagiarism in the materials presented in the modules. This aggravated by unavailability of to the students. Thus students more often than not have to rely on the quality of the modules given.

Face to face sessions were applauded for minimising isolation of student teachers. There is a concern, however, that these sessions are brief thus limiting the coverage of the course. They are also said to be intensive thus limiting interaction. There is also a dependency on face to face sessions to cover for all the instruction. In addition, there is a concern that they are held in centralised places instead of regional centres thus increasing the crowding and expense on the student teachers. Although running face to face sessions during holidays offers some flexibility it is a challenge in that it leaves virtually no time for the in service student teachers to relax.

Study group meetings offer learners an opportunity to interact, network and support one another. There was a concern, however, that no support is provided during these meeting. Assignments are essential and an opportunity for students to reflect on their experiences. Continuous assessment of this nature is said to motivate students to keep focused on the course. However, according to the student teachers the nature of these assignments can promote cheating and marking is not properly and promptly done. In addition, records are not well kept. Distance learning students tend to complain about loss of marks and scripts. The instruction is also challenged by poor communication between the student teacher and the instructors, inadequate interaction and lack of an opportunity to help students individually.

There is a concern that the programs are poorly planned and coordinated resulting in confusion and frustration of both the students and staff. There is also a worry that the number of students enrolled out numbers the staff available. The staff are said to be not only inadequate in numbers but also abilities. There is also a challenge of inadequate follow up of students.

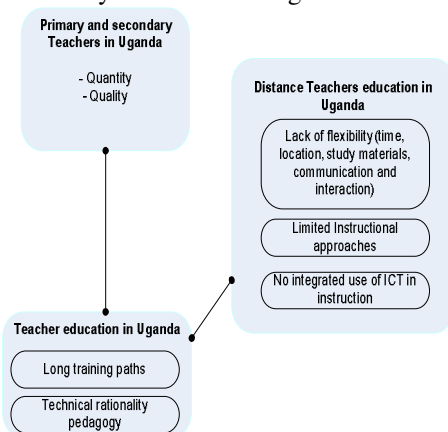
Access to resourceful libraries was applauded. However there was need to have this access more decentralised at regional or district level. The regional and district centres also need to be equipped with up-to-date study materials.

In response to what ICT distance teacher education is exposed to; radio stands out while video, computer and internet seems to be out of reach for many. Students identified places like hotels/bars, schools, computer kiosks, post office, workplace and coordinating centres as places where they could access ICT. The policy makers indicated that access to ICT is still a big challenge. The lack of integrated ICT use in distance teacher education posed a challenge (Ouma, 2003).

To wrap up we are compelled to conclude that the instructional approaches currently in use do not promote active involvement and interaction of the student teacher in the learning environment. Collaboration is somewhat minimized because of poor communication between the student teachers. Moderation by a lecturer or tutor is hardly there partly because of the numbers and also if they are distributed in the different study centres communication at a distance becomes a barrier. The learning environment is the intensive face to face classroom and the printed module. ICTs are hardly used in distance teacher education. Considering the critical state of teacher education and distance teacher education in Uganda, and the lack of integrated use of ICT in instruction, we summarise the problem context then put forward the research focus in the next section of this article.

### Problem Context

Figure 1 summarizes the key elements of the general research problem for this study.



**Figure 1: Problem Context**

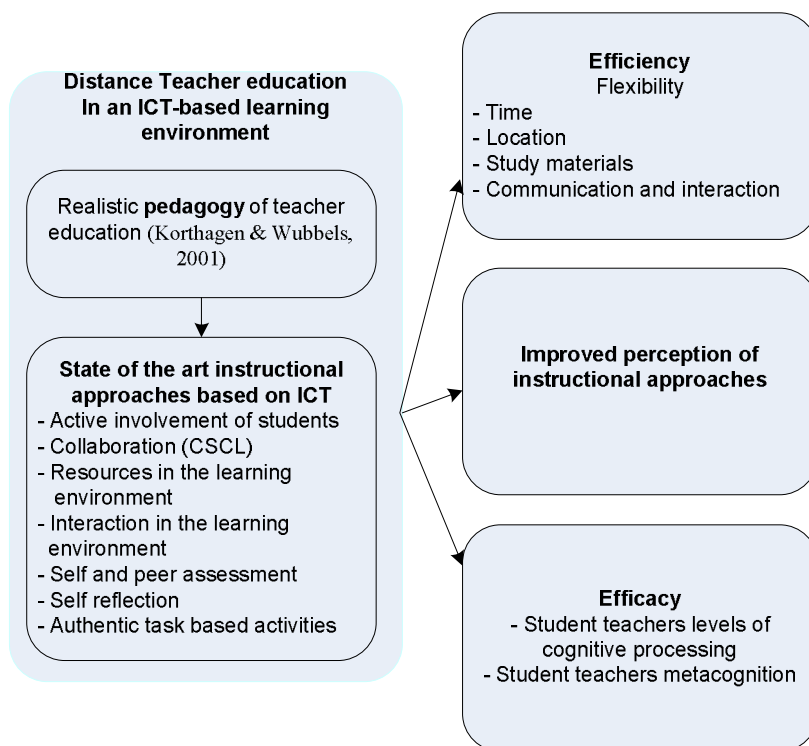
Bearing in mind the quantitative and qualitative status of teachers in Uganda in both primary and secondary schools, a thorough rethinking of pre-service and in-service teacher education is needed.



The existing routes to becoming a teacher in Uganda only offer to a limited extent opportunities to improve the quality and quantity of teachers. The full-time routes to upgrade teachers imply a too long disruption of the current classroom practice when they take study leave. In addition, we pointed at the critical state of the current dominant teacher education pedagogy in teacher education which leaves a lot to be desired. Whilst distance teacher education is available in Uganda, it lacks the necessary flexibility (in terms of time, the mode of instruction, the location of study, choice of communication modes and the level of interaction between the student teachers and their entire learning environment) to cope with the particular demands of in service teachers. In addition, the instructional approaches adopted in this delivery format of teacher education are very limited. The potential of ICT is not fully exploited to shore up distance education and/or to improve flexibility and the quality of the instructional approaches.

### Research Focus and Hypothesis

The study was guided by the hypothesis that realistic teacher education pedagogy oriented learning environment supported by ICT enhances efficiency in terms of flexibility, improves the perceptions about instructional approaches and promotes the efficacy of distance teacher education (Figure 2).



**Figure 2: Impact of a RTEP Oriented Learning Environment Supported By ICT on Distance Teacher Education**

#### ICT-supported learning environment

The ICT based learning environment as discussed in this research is labelled differently in the literature. Alternative conceptualisations are: virtual learning environment - Boulton (2002), web based learning environment - Khan (1997), www environment - Collis and Van der Wende (1999),

online learning environment - Chen (2002) and Uys (1998). In the context of this article these concepts will be used as synonyms.

### **Realistic Teacher Education Pedagogy (RTEP)**

The realistic teacher education pedagogy focuses on the integration of theory and practice. Realistic teacher education starts from the student teachers' experiences and their "Gestalts" rather than from the objective theories on learning and teaching in the literature (Korthagen and Wubbels, 2001). In this way, teacher education helps student teachers to become aware of their needs, to find useful experiences, and to reflect on these experiences (Korthagen, 2001b). At the *Gestalt* level, actions are typically based on unconsciously triggered needs, values, meanings, feelings and behavioural inclinations. This leads to the *schema* level, involving the actor reflecting on action (-in or -on action) and on other situations to form concepts, characteristics, and principles that are helpful in describing practice. The *theory* level, at which a logical ordering is constructed in the knowledge formed before as relationships between schemas are examined and several schemata may be connected into one coherent theory. The three level model connects several notions about teacher behaviour and teacher education into a coherent framework, and leads to tangible consequences for the work of teacher educators (Korthagen, 2001b). The realistic teacher education pedagogy is clearly reflected in the model of professional learning as developed by Korthagen and his colleagues (Kane, 2003). The five tenets of a realistic teacher education pedagogy are:

1. Realistic teacher education starts from concrete practical problems and the concerns as experienced by teachers in realistic contexts.
2. It aims at the promotion of systematic reflection of (student) teachers on their practices and experiences, on the role of the context, and on the relationships between these aspects.
3. It builds on the personal interaction between the teacher educator and the (student) teacher and on the interaction among the (student) teachers.
4. It takes the three levels of professional learning (*Gestalt, schema and theory*) into account, as well as the consequences of reflection at each level.
5. It has a strong integrative character. Two types of integration are central: integration of theory and practice and integration of subject disciplines.

Distance education in a RTEP oriented learning environment supported by ICT influences key aspects of an instructional context; i.e. the learning environment, the instructor roles and the student teacher roles.

### ***Implications of a RTEP Oriented Learning Environment Supported by ICT in a Distance Education Context***

As to the learning environment, the design of learning activities, provision of learning resources can be affected by adopting the RTEP. In *designing the learning activities*, it is important to consider the promotion of realistic teacher education tenets. Education starts from *concrete practical problems* and what the student teachers experience in real life contexts. Therefore, authentic learning activities should be presented to help students to draw from their experiences. In the ICT-based learning environment these activities help to link theory and practice. This is so because of the ability to use multimedia and also to foster live discussions on authentic tasks. Approaches that value both teachers practical knowledge and formal theories as relevant components of the knowledge base of teaching, and which confront each element with the other, are expected to enhance the quality of the teacher education experience (Verloop, Van Driel, and Meijer, 2001). Presenting activities that challenge personal teaching and learning activities are considered to foster problem solving and are helpful to elicit multiple perspectives from different students (Brookfield, 1995).

The learning environment should continuously challenge the student to adopt the *self reflection* attitude (Korthagen et al., 2001). In the learning environment there should be avenues to reflect on individual work and the work of others. Formative assessment can be embedded to support the gradual progress in learning through immediate, contextualized feedback and self reflection (Boulton, 2002). According to Rovai (2004), establishing asynchronous learning networks will

activate a reflective and thoughtful type of communication between students and encourage critical thinking. Authors also link reflection to the deeper levels of cognitive processing because of the opportunities that emerge to generating links between old schemas and new information. Systematic reflection invokes the combination, extension or alteration of the schemas and support better retention of new learning content (Mergel, 1998). Farrell (1998) describes five components of the teacher development model that provide opportunities for reflection that have implications for promoting reflection in the activities.

- 1) Provide opportunities for teachers to reflect through different activities that can be carried out alone, in pairs, or as a group such as group discussions, observation, journal writing or critical friends.
- 2) Establish some basic rules as to the process and each activity. A minimum set of guidelines are to be negotiated to insure a deeper, critical level of reflection beyond the mere descriptions of teaching activities.
- 3) Make provisions for four different kinds of time to reflect on their work:
  - a) Individual - a certain level of commitment by individual participants in terms of time availability should be negotiated by the group at the start of the process.
  - b) Activity - time that should be spent on each activity.
  - c) Development - this is the time it takes to develop analytical reflection and only progresses at a rate which individual teachers are ready to reflect critically.
  - d) Period of reflection - the time frame for the project as a whole. How long should a group, a pair, or an individual reflect?
- 4) Provide external input to enrich the reflection - input from "various experiences, other peoples' observations and reflection, and from other peoples' experiments, and from theories learned from research and the literature".
- 5) Provide for a non-threatening environment. Ways to establish a low anxiety level are to be incorporated, such as emphasizing description and observation rather than judging teacher input.

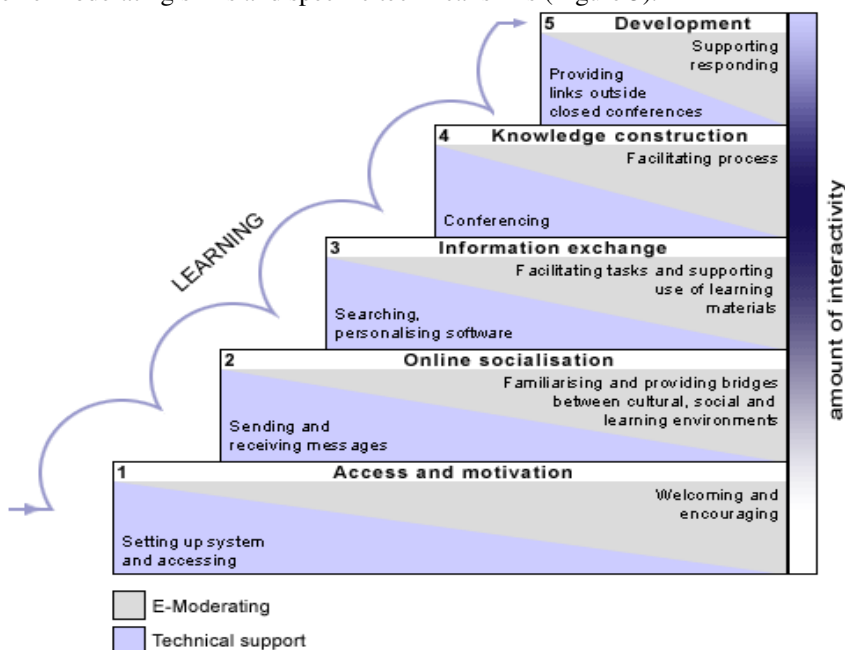
Learning in an ICT-based learning environment should be based on the *three levels of professional learning* in RTEP. This is fostered by knowledge construction in electronic discussion groups (Dougiamas, 1998; Duffy and Cunningham, 1996; Huekler, 2002). Learning in discussion groups is in line with RTEP requirements since knowledge is actively created rather than transmitted by the teacher, mediated by discourse rather than transferred through teacher talk, explored and transformed rather than remembered as an objective set of positivist idea (Holt-Reynolds, 2000). Given the central position of the students, the learning activities ought to be teacher-supported (Ruthven, Hennessy, and Deaney, 2005). This can be realized by adopting a structure with clear guidelines. In designing, the instructor has to analyze a task and to break it down into manageable chunks, to define objectives, and to state performance objectives (Mergel, 1998). Task characteristics are of importance with regard to levels of knowledge construction in such discussion environments (Aviv, Erlich, Ravid, and Geva, 2003; De Wever, Valcke, and Van Winckel, 2003; Schellens, Van Keer, and Valcke, in press). The environment should support either synchronous or/and asynchronous communication. Asynchronous communication is said to encourage to a higher extent reflection and composition (Boulton, 2002). And in the context of distance teacher education, this type of communication promotes the desired RTEP *personal interaction between the teacher educator and the (student) teacher and the interaction among the student teachers*. The online environment is expected to encourage the individual cognitive growth by fostering both independent learning as well as social interaction (Boulton, 2002).

In distance education, *learning resources* have to be prepared and made available in a more organized way as compared to a face-to-face setting (Wilson, 1997). In a web –based learning the same need is present as in traditional distance education settings. But in view of meeting the demands of RTEP, there is extra potential in using ICT: the use of multimedia to provide vivid visual support, alternative assessment approaches building on the use of portfolios, new didactical strategies based on collaborative projects and the provision of assistance and feedback for students after completing tasks (Holt-Reynolds, 2000; Ruthven et al., 2005).

### Implications of a RTEP Oriented Learning Environment Supported by ICT for Instructor Roles in Teacher Education

Moderation is an important element in the communication between the instructor and students in an ICT based learning environment. Rovai (2004) stresses that experienced online instructors can build and sustain levels of community that are at least equal to those experienced in traditional classrooms. In promotion of a realistic teacher education this moderation should promote reflection. This can be through the instructor focusing attention on the reflection content (Korthagen, 2004). Farrell (1998) contends that reflective teaching can advantage student teachers in four ways: (1) it frees the student teachers from impulsive and routine behaviour; (2) it allows student teachers to act in a deliberate, intentional manner and avoid the "I don't know what I will do today" syndrome; (3) it promotes intelligible action; (4) it helps student teachers to grow beyond the initial stages of survival in the classroom and helps them to reconstruct their personal theory about teaching.

This demands from instructors in virtual learning environments efforts to scaffold the learner. The virtual teacher is expected to review the progress of the students, to tailor the tasks or activities for individual students to allow them to expand areas to be developed (Boulton, 2002). A constructivist moderation model (in which the instructor, volunteer teaching assistants and student facilitators learning together) fostered active learning and provided scaffolding for students to become facilitators for learning (Murphy, Mahoney, Chen, Mendoza-Diaz, and Yang, 2005). Peer tutoring plays a significant part in online learning however its behaviour is tutor dependent (De Smet, Van Keer, and Valcke, in press). Moderation in ICT-based learning environment has only been researched to a limited extent. One of the defining authors in the field is Salmon (2000). Her research identified five stages in e-moderation, each focusing on the development of consecutively more complex e-moderating skills and specific technical skills (Figure 3).



**Figure 3: Electronic moderation model - Source: Salmon (2000)**

At stage one, the moderator supports individual access and the ability of participants to use computer mediated communication (CMC).

At stage two, individual participants have to be fostered to establish their online identities and to find others to interact with.

At stage three, participants are stimulated to exchange information relevant to the course. In this way co-operation is supported in view of shared goals.

At stage four, course-related group discussions are stimulated and a collaborative interaction becomes established. The moderation stresses the creation of shared understanding.

At stage five, participants are supported to achieve the shared goals, to explore to integrate the CMC experience into other forms of learning and to reflect on the actual learning process.

At each stage, moderation focuses on intensifying the level of interaction as indicated by the “interactivity bar” at the right hand side of Figure 3. Initially, interaction is fostered between two to three learners. Later on, interaction with the larger group becomes essential. In addition the moderation also focuses on fostering the number of interactions between the learners. At the highest level, individual reflection has to occur and the overall number of interactions is expected to become lower.

### ***Implications of a RTEP Oriented Learning Environment Supported by ICT for Student Teacher Roles in Distance Teacher Education***

Given that most of the distance teacher education students are in-service teachers, we have to consider that they seek opportunities that challenge them in relation to the daily demands of their classrooms (Sandholtz, 2002). It is therefore important for teachers to build on the *reflection on their practice*, to experiment with new ideas and to share experiences with their fellow students (Hoban, 2002).

The individual student is to adopt an *active role* in the learning process to utilise the learning environment, harness the support of the instructor and benefit from the tenets of realistic teacher education pedagogy. The model of Salmon (2000) described above, also indicates that specific skills have to be supported and developed in students in order to become actively involved in the learning environment. Being active involves the following: self regulation, self reflection and willingness to collaborate.

The term self-regulated learning (SRL) emphasizes the autonomy and responsibility of students to take charge of their own learning (Paris and Winograd, 2001). Self regulated learning presumes that students who are active take control of their own learning at any age level or in any learning situation perform better and achieve better results (Wilson, 1997). Paris et al. (2001) contend that self-regulated learning is characterized by three central features; awareness of thinking, use of strategies, and situated motivation. This is a compelling learning goal in the context where an instructor is not readily available. But it is also an essential goal, given the job market demands of this specific student target population. Self regulating students have to be intrinsically and extrinsically motivated. They need a strong awareness of their personal cognitive skills to remain focused on their learning. This implies that the ICT based learning environment should enable them to do so (Wilson, 1997).

Reflection is a key element of the RTEP. Reflection in a RTEP oriented learning environment supported by ICT can take various forms; such as regular self-assessment of individual or group learning processes, personal monitoring of progress, or promotion of a feelings of self-efficacy (Paris et al., 2001). This creates a personal need for learning (Korthagen, 2001a; Richardson and Placier, 2001). Student reflection is derived from a cognitive perspective that asks learners to rethink their practice and helps them to cope with similar situations in the future (Hoban, 2002; Wilson, 2005). Farrell (1998) distinguishes five types of student reflection: (1) Technical rational reflection that builds on examining teaching behaviour and personal skills after an event, such as a classroom experience; (2) reflection in action (reflective practice); (3) reflection on action (reflecting on our reflecting-in-action), (4) reflection for action (reflection to guide future action) and (5) action research (transformation of research into action). Teacher education should aim at helping the student teacher to become aware of these different types of reflection (Korthagen, 2005; Korthagen, 2004).

The realistic teacher education pedagogy builds on a social constructivist paradigm. According to this epistemological and instructional position, cognition does not reside solely in the individual, but emerges collectively, as a distributed social cultural production (Edwards, Gilroy, and Hartley, 2002). The social nature of learning is derived from a situated perspective and supports student

teachers to share experiences in view of learning (Hoban, 2002). Increasingly, teacher educators ask student teachers to elicit personal ideas as a basis to construct new, more reasoned, more accurate or more disciplined understanding (Holt-Reynolds, 2000). Moreover, studies indicate a relationship between the development of effective constructivist learning environments and the development of high levels of knowledge in learners (Richardson et al., 2001). Collaboration enables students to construct knowledge in a social environment. To be successful in the learning environment, students need to know how to work independently, how to collaborate with their peers and, and how to balance these two modes of working (Shaffer, 2002; Soraya, Rahman, and Salim, 2004). In the context of an ICT-based course, student teachers particularly value the opportunity to learn from one another (Wiske, Sick, and Wirsig, 2001). Cognitive growth is fostered through dialogue and discourse, making private knowledge public and developing shared understanding (UNESCO, 2002). In the context of distance teacher education this also counters feelings of isolation (Dymock and Hobson, 1998; Henri, 1994; Trindade, Carmo, and Bidarra, 2000). In addition, online collaboration is an avenue for peer coaching and peer evaluation. Peer coaching is the process during which, on the basis of mutual trust, two or more peer students cooperate in order to reflect on their own practice, to exchange ideas, to teach each other, to do action research in their classrooms or to try to solve problems in the work place (Akker and Bergen, 2000). In the literature, peer tutoring is used as a synonym for peer coaching. The feedback from peers gives useful information to rethink one's own contribution. Also the realisation that others will read and judge the personal input in an ICT based learning environment, pushes learners to present their work in a clear and comprehensible way (de Jong, Kolloffel, van der Meijden, Staarman, and Janssen, 2005; Rovai, 2004).

As previously explained, the realistic teacher education pedagogy and the fact this is to be implemented in an ICT based learning environment, redefines the role of the teacher educator, the student and the learning environment in teacher education. In the next paragraphs we discuss in more detail the expected outcomes of studying in this kind of learning environment. We consecutively focus on the three central dependent variables as represented in Figure 2.

### **Impact of a RTEP Learning Environment Supported by ICT**

#### **Impact of a RTEP Oriented Learning Environment Supported by ICT on Efficiency of Distance Education**

Information and Communication Technologies (ICTs) are yet not fully integrated in distance teacher education in Uganda (Aguti, 2003; Ouma, 2003). In the present study we hypothesize that the integrated use of ICT in distance teacher education will promote the efficiency in terms of flexibility. In view of this hypothesis we build on research that stresses the flexibility in study location, study program, types of interaction, communication channels, alternative learning resources and flexibility in the time (moment, duration) to study (Collis, 2001; van Merriënboer and Brand-Gruwel, 2005). Flexible distance teacher education facilitates school-based training, and enables a close link between theory and practice. This thwarts the emergence of technical rationality as criticized earlier in this chapter (Creed, 2001).

#### **Impact of a RTEP Oriented Learning Environment Supported by ICT on Student Teachers' Perceptions of Instructional Approaches**

The elements of instruction change their role in an ICT based learning environment supported by RTEP. This change is hoped to impact student teachers' perceptions of the learning environment and instructional preferences.

Notably, the ICT-based learning environment resulted in college students' positive perception of learning with technology in particular for giving more autonomy to the learner (Schonwetter and Francis, 2002). In another example, on the subsequent experience in an internet based course there were significant positive changes in student's satisfaction with the Internet as a delivery medium, their perception of participant interaction, and the usefulness and ease of use of the course software (Arbaugh, 2004).

Students' instructional preferences are influenced by the learning environment. For example, in an Internet-based course students were found to attribute higher importance to values that emphasize independence in thought and action, creativity and curiosity (Beyth-Marom, Chajut, Roccas, and Sagiv, 2003). Internet learning environments that challenge student conceptions influence the preferences for instruction that build on student negotiation, inquiry learning and reflective thinking (Wen, Tsai, Lin, and Chuang, 2004). Due to the collaboration promoted by an ICT-based learning environment, student teachers particularly valued the opportunity to learn from one another (Wiske et al., 2001).

### **Impact of a RTEP Oriented Learning Environment Supported by ICT on Efficacy of Distance Education**

To operationalise the efficacy of distance teacher education, we focus on the levels of cognitive processing that students are able to attain during participation in online asynchronous discussion groups (also called Computer Supported Collaborative Learning – CSCL) and meta cognition. We anticipated that during discussions groups, students solve problems from multiple perspectives and evolve beyond their actual developmental level. This would imply minimal expert guidance and build mainly on collaboration between – equally able or differently able - peers (Bednar, Cunningham, Duffy, and Perry, 1992; Shayer, 2003). This can be related to conceptualisations of Vygotsky when he refers to the "zone of proximal learning" (Vygotsky, 1978). Research confirms that exchanging multiple perspectives provokes discussion and leads to enhanced knowledge construction (Johnson and Johnson, 1996; Johnson and Johnson, 1989; Slavin, 1996; Veerman and Veldhuis-Diermanse, 2001). Through collaborative group work, the goal is to share alternative points of view (Cunningham, Duffy and Knuth, 1993; Savery and Duffy, 1995; Sharan and Sharan, 1992). Earlier research puts forward tangible evidence that CSCL influences positively the levels of cognitive processing (De Wever et al., 2003; Gunawardena, Lowe, and Anderson, 1997; Mcloughlin and Luca, 1999; Schellens and Valcke, 2004).

The experience in a RTEP oriented learning environment supported by ICT is hoped to promote student teachers' meta cognition. Learning environments that are conducive to the construction and use of meta cognition are said to improve self knowledge and regulatory skills (Schraw, 1998). For example, comparable to the individual learning context, monitoring, planning, and evaluation activities are found to frequently occur in the CSCL contexts as well (de Jong et al., 2005). Also, the synchronicity of online interactions gives participants time to reflect on a topic before commenting or carrying out online tasks (Harasim, Hiltz, Teles, and Turoff, 1995; Swan, 2001). Learning in an ICT-based learning environment involves asking people to focus on their own problem solving, to explain what they are trying to do, and this is said to promote metacognitive processing and leads to more effective problem solving, even when the questions are no longer asked (Dominowski, 1998).

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