# A TEACHER PROPOSED HEURISTIC FOR ICT PROFESSIONAL TEACHER DEVELOPMENT AND IMPLEMENTATION IN THE SOUTH AFRICAN CONTEXT

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**ABSTRACT**
This qualitative interpretive exploratory case study investigated a sample of South African teachers' perceptions of the requirements for successful implementation of Information and Communication Technology (ICT) Professional Teacher Development (PTD) within disadvantaged South African township schools in the Port Elizabeth district in South Africa. The participating teachers' (n=30) perceptions and experience of ICT PTD were explored via qualitative semi-structured interviews, an open-ended questionnaire, internet user group responses, reflective journal writing and facilitator reflections. The findings indicate that they value three aspects, namely facilitator related aspects, training context aspects and school related aspects. These findings underpin the $C^2RHOAR^3FS^2R^2$ framework offered as a heuristic for ICT related PTD and subsequent school and classroom implementation. The $C^2RHOAR^3FS^2R^2$ acronym refers to Care, Competence, Relate, Hands-on, On-going, Assessment, Reflection, Read, Revise-replan, Feedback, Share, Support, Recognition and Resources. The expectations of the teachers resonate with international expectations of Professional Teacher Development and underscore the magnitude of the task for those who aspire to meet the challenge they present.
**Keywords:** Professional Teacher Development, ICT, teacher expectations, technology, computers

## INTRODUCTION

The South African *White Paper on e-Education* makes explicit the type of learning envisioned, the ICT levels that are needed, and the type of school that is required for successful ICT provision (Department of Education, 2004). In 2007, the Department of Education published *Guidelines for Teacher Training and Professional Development in ICT* (Department of Education, 2007) which recognizes the need for Professional Teacher Development (PTD). This document highlights the importance of the teacher in the implementation process, and the need for teacher training in order to establish ICT knowledge, skills, values and attitudes. However, it provides very little information on how teachers and schools are expected to practically integrate or make use of ICT within the South African context. Similarly, Hodgkinson-Williams (2005) has also referred to this '*missing link*' previously with special reference to the *White Paper on e-Education* (Department of Education, 2004). These sentiments have also been echoed by the South African National Research Foundation (NRF) website which likewise highlights the need for research regarding ICT and PTD. Educators are also recognized internationally as key role players in successful implementation and integration of ICT (Ertmer, 1999; Fullan & Smith, 1999; Prensky, 2008) and, as such, the purpose of this paper is to provide a snapshot of the perceptions of a sample of practitioners who participated in a year-long PTD intervention as to what they believe is required to best facilitate ICT teacher development and integration of ICT in their schools.

### Professional Teacher Development (PTD)

Research suggests that Professional Teacher Development (PTD) should be embedded in constructivist learning environments, be situated in real classroom contexts, and make provision for reflection opportunities, classroom observations, and peer collaboration (Hawley & Valli, 1999; Sandholtz, Ringstaff & Dwyer, 1997; Vrasidas & Glass, 2005). Williams, Coles, Wilson, Richardson and Tuson (2000) provide evidence that a hands-on approach, reflection, 'on the spot' support and the sharing of ideas among participants are important elements during planning and the implementation of PTD. They also point out that poor facilitation, a too quick a pace and information overload contribute to unsuccessful implementation. Hoban (2002) and Turbill (2002) concur on the importance of teacher reflection during PTD, but also add that PTD should embrace the development of a community of practice, i.e. people at the centre assisting those at the periphery until they also become experts.

Ertmer (2001) and Hawley and Valli (1999) suggest that teachers should be encouraged to identify their needs where possible and what kind of assistance they require. They also propose the need for collaborative problem solving and the sharing of expertise related to problems experienced and problems that have been solved by the participants during PTD (Hawley & Valli, 1999). Burns (2002) agrees and adds that the sharing of experiences, discussion of the use of specific instructional approaches or/and software within the classroom, and training embedded in real-life contents allow teachers to experience PTD as enjoyable and useful. Birman, Desimone, Porter and Garet (2000), Garet, Porter, Desimone, Birman & Yoon (2001), Lawless and Pellegrino (2007) and Royer (2002) believe that PTD should be on-going and that 'one-shot sessions' are not effective. Glazer, Hannafin and Song (2005) argue for on-going support, but add that this support should be designed in such a

manner that it can be rendered to teachers' during the school day. Glazer et al. (2005), Hinson, Laprairie and Cundiff (2005), Hinson, Laprairie and Heroman (2006) and Royer (2002) all argue that teacher professional development has to transcend the intensive seminar approach and must become situated within the teachers' working contexts, and move away from a transmission model (see Hoban, 2002) to a responsive dissemination approach, focusing on on-going feedback, on-going development and continuous improvement.

Watson (2001) believes that teacher-as-leaders should be developed at school so that they can provide on-going on-site support while Richardson (2003) highlights the importance of an outside source as facilitator/staff developer. Tiene and Luft (2001) also note the importance of an outside administrative facilitator to schedule meetings and serve as a liaison between the participating schools and the professional developers; a staff member who can assist in realizing the curricular suggestions made by the teachers. Hayes (2005) points out that technical support is also crucial, as do Tiene and Luft (2001) who call for a staff member to be available to work directly with the teachers and the learners, assist with implementation, and be responsible for technical support.

Herrington and Kervin (2007) and Herrington and Oliver (1997, 2000) summarize the key elements in PTD succinctly by recommending that PTD should embrace authentic contexts that reflect the way that knowledge will be used in real life using authentic activities; it should provide access to expert performances and modelling of the intended processes; it should foster the collaborative construction of knowledge; it should provide opportunities for reflection, discussion and feedback sessions to enable tacit knowledge to be made explicit; it should provide the necessary safety nets through coaching and scaffolding by community members at critical times, and it should be built around a community of practice (see Dennen, 2004).

## RESEARCH DESIGN AND METHODOLOGY

Teachers from disadvantaged schools located in the Missionvale Township of Port Elizabeth in the Eastern Cape Province voiced a need, via their principals and other school representatives, to be empowered to become skilled users of computers and the Internet. These disadvantaged schools serve the poorest of the poor in black South African township and have minimal financial resources and access to ICT resources is virtually non-existent. In order to assist some of these schools, the Dell Foundation was approached by the Centre for Educational Research, Technology and Innovation (CERTI) at the Nelson Mandela Metropolitan University (NMMU) in 2008 to provide sponsorship for six of these schools (four primary schools and two high schools). This resulted in a sponsorship of 20 computers for each of the six schools. Five schools were provided with 'line of sight' wireless Internet connectivity sponsored by the Hermann Ohlthaver Trust. The connections were installed by NMMU ICT specialists. Thirty teachers, distributed fairly evenly over six schools, participated in a year-long ICT PTD intervention and participated in the research aspect of the study.

### *Data gathering tools*

Data were collected by means of internet user group records, audio-taped semi-structured interviews, an open-ended questionnaire, teacher journals and facilitator reflections. The internet user group data was generated via open-ended online questions which the participants answered during training; questions such as *"What characteristics should the project leader (facilitator) keep in mind while training? Why?" What should the project leader (facilitator) keep in mind (think about) during the preparation process? Why?"* and *"What was positive about the development program / process so far? (What did you like?)."*

The journals, which the teachers completed weekly, provided responses in writing to questions such as *"What problems did you experience?", "What was positive about the development program / process so far?"* and requests to *"Make suggestions on what to change or how to improve."* The open-ended questionnaire contained questions such as, *"What skills does a good facilitator or coach need to be successful in the ICT project?", "What factors are necessary to be successful in this ICT project?", "How can the facilitator or coach of this project ensure that this project is a successful project?"* Interview questions that were posed with reference to PTD, included *"Tell me what do you think are the needs of the teachers?", "What do you think are the main challenges at your school?", "You said you require training, who should do the training?", "What do you think they will need during training?", "What do you think the facilitator should do during the sessions, how should he teach or facilitate?"*

### *Data analysis, interpretation and trustworthiness*

Codes were assigned using a demonstration version of the software package MAXQDA in order to explore patterns and regularities (Coffey & Atkinson, 1996; Yin 2003a, 2003b) which might have implications for both theory and practice (Drew, Hardman & Hosp, 2008). Validity or trustworthiness was addressed by using multiple sources of evidence and attempting to establish a chain of evidence (Cohen, Manion & Morrison, 2007;

Yin, 2003a, 2003b). While the findings do not allow generalization, modest extrapolations which could lead to applicability in other similar, but not identical, situations, can be made (Patton, 2002).

***Ethical measures***

The teachers from the participating schools were volunteers, could disengage with the project at any stage, and were informed that the data generated would be used for publication purposes. Aspects of the process, for example the internet user group, were anonymous. The project was approved by the Department of Education (Port Elizabeth District Office) and principals and school representatives attended a number of meetings where the research project was explained and discussed.

## RESULTS

Inspection of the data suggested three main dimensions or categories, these being aspects which relate to the facilitator, the training context and the school. These categories, and the sub-categories in each, are elaborated below and reference made to previous research which the respondents intuitively supported.

### Facilitator related aspects

***Care and Relate***

The participants suggested that the personal attributes of a facilitator is a vital aspect contributing to the success or failure of a project (O'Connor & Ertmer, 2006; Havelock & Zlotolow, 1995). Data from the anonymous internet user group suggest that a successful facilitator would be friendly, approachable, patient, tolerant, a good listener and knowledgeable, hence portraying a caring attitude or approach (George & Camarata, 1996; Harris, 2002; Havelock & Zlotolow, 1995). Examples of statements supporting these perceptions are; *"Patience is needed as I belong to old school of thought and computers are new to me", "A facilitator has to be friendly, approachable"* and *"Patience, determination and openness"* and *"We need somebody who is open, who we can approach easily"*.

The importance of care is apparent in the following interview comments; *"I would like the facilitator to be kind and patient because the teachers have got old minds", "They must keep in mind that some teachers do not have a computer background so they must be at least tolerant because they will have to start from scratch."* Such issues are also reported in the work of George and Camarata (1996), Harris (2002) and Havelock and Zlotolow (1995). Interview data also suggest that relating to teachers as individuals is an important dimension, as illustrated by the following transcripts; *"Perhaps they have a fear of not knowing how to use a computer", "The main characteristic is patience and be willing to endure because the teachers come with their own schedule and workload so they need to understand, the seed needs to be sown and they need to be inspired. If it's going to be forced down it's not going to help them."*

***Competent, listener, clear in explanations and passionate***

Data generated via internet user groups indicated that the teaches believe a project facilitator should be competent and passionate: *"Someone who has passion, someone who has knowhow of dealing with the primary learners, primary teachers, someone who is used in doing workshops and somebody who would make a very good follow-up and understand and evaluate the work that would be done"*. Others concurred, stating *"He [should] know his job, know how to deal with people and be really understanding"*.

The data also suggest that clarity was something that was important for the teachers; *"I suppose the first and foremost thing is to know the computer and be able to explain clearly so that teachers can hear and understand what you are saying. I think that those are the things that are important"*. Other data indicate that the participants believe that a facilitator should be positive, passionate, accessible, and helpful and have some degree of understanding of the participants, as espoused by, amongst others, Ertmer (2001), Hawley and Valli (1999) and Royer (2002).

### Training context aspects

***Hands-on, practical, empowering and fruitful***

The teachers felt that it was important that the professional development context should be empowering and provide the skills necessary for school level implementation. A need for fruitfulness became evident when participants stated, *"Everything they do must be practical and he must show them always the relation between computers and their learning areas, how it combines. If they can't see the significance of having a computer and how it will help their learning areas then they won't buy much into it. For example drawing up a lesson plan if they can see we can use the internet for information and they see the usefulness of it. They must eventually see that the computer can enable them and assist them in their work so the instructor must constantly emphasise the*

*usefulness of the computer in education"*. This need was explicitly stated as; *"Other programmes [from the DOE for example] have been too theoretical, but this one was hands-on"*.

***Assessment of prior knowledge and progress during the training process***

Participants also mentioned the assessment is an important aspect during teacher professional development (Birman et al., 2000; Garet et al, 2001; Herrington & Kervin, 2007; Hoban, 2002). Assessment prior to the training was viewed as important, as it enables a facilitator to have insight in where to 'meet' his participants, *"[The facilitator] Must first find out who are computer literate"* and *"I should think it's about the known to the unknown so the facilitator should know that the level of knowledge about technology of those teachers is very much minimum so he must not take for granted that these teachers know computers or they know how to go about, he has to take them step by step so the approach is very important also he has to know that these are the people, as much as they are professionals, they are starting from the lower level and he builds up to their expectations."*

Regular monitoring of progress during the training sessions was also seen as being important, as this would enable the facilitator to ascertain who are in need of assistance and to plan for subsequent training sessions. This perceived need became evident when participants stated, *"[The facilitator should] Try to make it a point that a least everybody understand the day's work and make sure that manuals are available before the training starts so that we are able to go through this at home before attending the next day"* and others mentioned "*The skill of monitoring those who don't understand"* is important as *"He must be observant, must be good in assessing."*

***Manuals and hand-outs are important***

The importance of well documented notes or hand-outs (Hodgkinson-Williams, 2005) was also mentioned in the open-ended questionnaire and journals; *"Make sure that manuals are available before the training starts so that we are able to go through this at home before attending the next day"*; *"Participants must have notes. They must be shown what to do and check if they have mastered"* and *"I am the kind of person who wants to achieve the best in anything. So if I can have a textbook that guides me, I will use it for sure."*

***On-going training sessions***

Participants stated that the training should not be limited to a once-off one-day or once-off one-week training programme, which is the usual format used by the Department of Education training (Hinson et al., 2005; Lawless & Pellegrino, 2007; Royer, 2002). In the words of a participant when she stated that what is required is that *"It should be continuous [over a period of weeks] rather than getting a week's training and you are left with a certificate [like the Department of Education's training], but knowing nothing. [And then] You are not confident to teach others."*

***Work at own pace and accommodate everyone***

The participants indicated that what they require from teacher development is that it should focus on creating learning spaces in which they can work at their own pace (Ertmer, 2001), and that they should not be expected to grasp everything that is required at once; *"The fact that we are not pushed, we are taught so as to know not in a rush"* and *"This one [ICT training project] accommodates everybody even if they don't have the computer skills."*

***Collaborative non-threatening atmosphere conducive to learning***

The participants indicated that what they valued of the current ICT teacher training sessions were the fact that the classroom training context was experienced in a non-threatening way (Havelock & Zlotolow, 1995; Mahn & John-Steiner, 2002). This became evident in responses such as, *"The environment is very relaxing*", *"The presenter of the program is welcoming makes one feel free to ask questions for any difficulty that one comes across with", "I feel comfortable and stress free. The facilitator does not harass us. I am beginning to feel a bit confident on typing, although I am still slow, I am improving", "The facilitator's explanations and gives help when everyone even you need it."*

***Reflection is important for the participants and the facilitator for learning and planning***

Interview data revealed that the teachers valued completing the reflective journal sheets at the end of each training session (Hoban, 2002; Turbill, 2002), and stated that it was important that these sheets should be returned to them at the beginning of each new session. The participants also noted that the journal reflection sheets provide opportunities for a facilitator to determine where the participants need assistance, adding that a successful project facilitator would make a special effort to provide feedback ; *"We need feedback so that we can see how far have we gone and what we need to do … to continue on the right track"*. Another participant concurred when he stated; *"They [journal reflection sheets] are of value, because it is very important to the*

*participant to know in order to repeat what you [the participant] left out in the past lecture." "It is important for me, because the instructor is trying to make me understand ... [so when I have a problem, I can indicate the problem in the journal] and [then the project facilitator can] explain clearly that particular question that I do not understand."* Others believed that the teacher reflective journal entries could assist a facilitator's planning; *"It will also enlighten the facilitator what to prepare for the next lesson and where to start so that you can know exactly the information that the educators have.*

**School context aspects**

***Sharing experiences with peers at school is important to show the value of ICT and to learn from one another***

The sharing of experiences was seen as important (Birman et al., 2000; Garet et al., 2001; Nonaka, 1994; Vrasidas & Glass, 2005) as it would assist in communicating the benefits of ICT training, *"Teachers should share with their peers in terms of reporting to them how the training was, what did they learn, going back to the class, encouraging their peers."*

Sharing experiences was also viewed as a developmental process, i.e. helping one another to learn from one another (see Nonaka, 1994). This is evident from the following interview response; *"It would be about what we call developing each other and to see how far each and every educator from the others in terms of knowledge and how to handle the software and technology and it would be done through staff development so that whoever has been lacking behind has to be in the group and work as a team and also knows different methods, different approaches, different ways of dealing with problems because I really feel that if I'm having this problem I'm sure someone else has experienced such a problem and he has tried to handle it in a better way maybe more than myself so the exchange of ideas and showing each other and trying to top up the knowledge that they got, that is what will make them successful so the practice and the practice and sharing ideas it will make them to be perfect."*

***Support with implementation and resources from the Department of Education***

Participants were adamant that support is one of the key elements that could ensure success (Ertmer, 1999; Glazer et al., 2005; Mueller, Wood, Willoughby, Ross & Specht, 2008). *"For me it would be very helpful if the department of education can get on board."* Another educator alluded the fact that support is not forthcoming; *"The very department who has employed us should be our biggest supporters, but the problem is that when you go there they have empty promises so now you need support from somebody who is going to be following up and who is going to be genuine with the love that he has for the computer"* Another teacher noted; *"Past experience has taught one that NGOs are the people who develop schools", "Eastern Cape Department is dead as compared to other provinces"* and *"The Department of Education is full of promises."*

The participating teachers also lack support in the form of their own computer resources. The need for having their own computers were voiced when on computer literate teacher stated that the problem is that *"They [the teachers] don't even have computers in their home, they don't know internet they don't go to the café shop."* The responses in the open ended questionnaire affirmed the need for resources from the Department of Education, *"Supply us [as teachers] with our own computers at home to all those who attend, please because we are in need"* and *"Subsidize attendees with computers."*

***On-going support with implementation from the facilitator***

The support role of the training facilitator (Herrington & Kervin, 2007; Herrington & Oliver, 1997, 2000; Tiene & Luft, 2001; see also Dennen, 2004) was also highlighted as an imperative; *"There must be somebody that goes around the schools to see how we are doing … So that he can see maybe that a particular person needs some more support or information will be able to get that." "You need to not disappear. You need to guide us, constant observation. Look what we are doing because [Organisation A] made the mistake of giving the computers and then see for yourself what you can do. There is no way you can leave the school"*. Another participant stated, *"After he [facilitator] has trained, he must check them in a classroom performance for instance he has trained me and then he must check me the things he has taught me, that have you followed, where are you know, what are you doing, what is your problem, so those are the things that are very important, because there must be a friendship relationship."*

The importance of continuous on-going support to assist with solving problems is evident in the following response; *"Continuous support for the school [is required] because there will be times that even after training we encounter a problem and not being able to complete a task at hand and you ask the facilitator to help with solutions and they show their willingness to help and in the end there is proper communication with the school and the NMMU."* Participants also mentioned that they should not wait for a long time to receive support at school; *"If we need you, you must be available."*

***Support from the inside the school: Principal and staff development sessions***

Participants also felt that there should be support and monitoring from the leadership structures in schools (Hayes, 2005; Wilmore, 2000), for example from the principal or through the establishment of a supporting computer committee; *"The principal must support because he is the mouth piece/middle man. He must attend the meetings. I'm just the ones who give the instructions, but he is the person who must get the teachers involved."* Another teacher concurred that the role of the principal is paramount, as the principal should create opportunities for teachers to develop their ICT skills, especially those who are not yet computer literate; *"She must assist us in training teachers, as not all of us are computer literate."* The importance of having school staff based development sessions organised by the schools was seen as vital (see Tiene & Luft, 2001) as these sessions could provide opportunities to 'pull up' those who are lacking in ICT skills and experience.

***Support in the form of a specially appointed teacher at school***

Calls were made to have one person appointed enable learners to visit the computer room on a regular basis (Hayes, 2005; Richardson, 2003; Tiene & Luft, 2001; Watson, 2001;). The rationale behind this is that high teaching loads do not allow teachers to take their learners to the computer room on a regular basis and use the facility in an integrative manner. The following excerpt illustrates the above, *"Our learners are so interested, they are so motivated to visit the computer lab, but the problem is that most of the educators they are so loaded with the other subjects that it is not easy for them to be there the whole day at the computer lab, otherwise if you can get, even the department, we were trying to request so that there can be somebody specialising there who will be there for the whole day so that even after school, the learners who are not attending can get a chance to attend but we have got no way the department is not going to give us a post."*

***Recognition motivates***

Participants reported that feeling valued is important and that rewards serve as a motivator, *"It's like you tell them within this training you are going to get a certificate so the carrot for the rabbit is the certificate."* Another one concurred an added that the more advanced ICT teachers should be provided with opportunities to further their training with an accredited university module, as this could further heighten interest and hence motivate, *"I'm a little bit advanced compared to the other teachers here at school maybe allow me opportunities if the university has a course that will ensure I will get a certificate which will make me more interested in training more people."*

## Proposed framework and recommendations for future PTD

The following framework for ICT PTD based on the findings in this study and the research findings of others reported earlier in this paper is proposed (Figure 1). The acronym $C^2RHOAR^3FS^2R^2$ is used to encompass all the aspects of the framework (as indicated by each letter in the acronym). Care refers to establishing a learning context in which the participating teachers feel that they are cared for and believe that the will be able to succeed. Competence refers to the fact that the facilitator should be knowledgeable not only about what is presented, but also the manner of 'how' it is done. Relate refers to building a relationship between the facilitator and the participating teachers as well as knowing their needs.

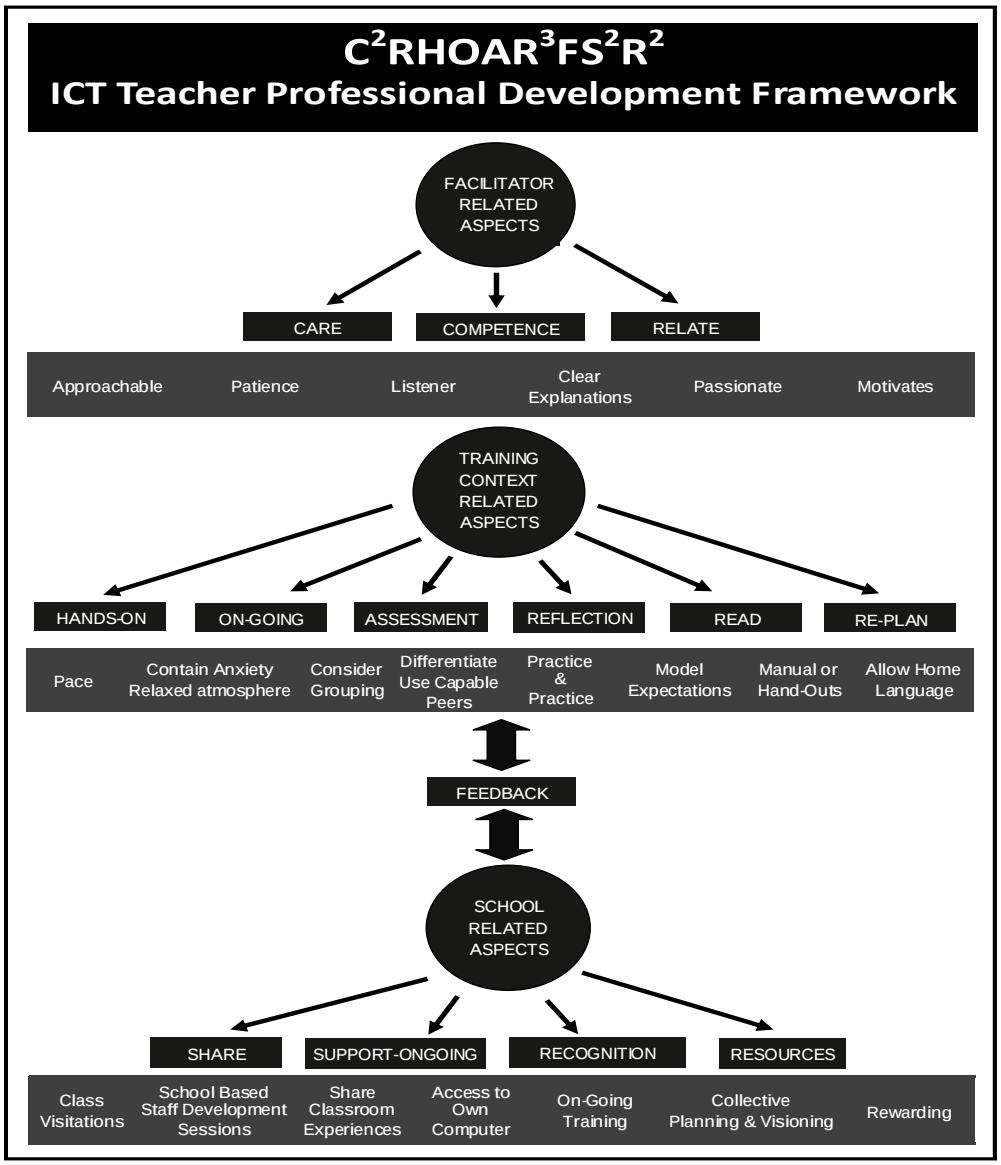


**Figure 1: A proposed heuristic for ICT Professional Teacher Development**

Hands-on refers to the fact that participant should be trained within context and in a practical manner. On-going suggests that the teacher development sessions cannot be once-off, while assess implies that a facilitator should obtain an understanding of the participating teachers' needs, prior knowledge and skills throughout the teacher development process, as well as how they progress at school within the classroom context. Reflection in the framework refers to the completion of reflective journals where participants can reflect on their progress. The rationale behind the reflective journals is that these journals serve as a tool, enabling both the designer and the participating teachers to obtain a snapshot of their progress, enabling a facilitator to plan for subsequent PTD sessions and assisting the participants to indicate where they need assistance. Reading and re-planning using the teachers reflective journals are interlinked - the facilitator reads the journals to plan, re-plan or/and make the necessary revisions for the next session. The reflective journals sheets could also become an identifier of 'capable peers', i.e. participants who are more advanced or who are progressing faster and who could be used as co-assisters during training sessions.

Constructive feedback provides an overall picture of the community of participants' progress sharing refers to opportunities for the participants to share their experiences of the learning process with their peers - either in their groups or with the whole class - in order to articulate their tacit knowledge, experiences, successes and needs, both during training and at school level. Support implies classroom visits by either the project facilitator

and/or other capable peers in order to render assistance and/or to discuss the successes, the areas where assistance is required and to plan how to address the identified issues at hand. The teachers in this study suggested the establishment of an internal school based support group which would meet regularly and that the principal and the senior management team (SMT) should create the necessary learning space, as well as emotional and motivational resources as well as opportunities to share what has been learned. An aspect of support could also be the appointment of a dedicated person responsible for ICT implementation at schools who is responsible for initiating and sustaining the implementation process. The data highlights the fact that recognition serves as a motivator and the importance of teachers having access to computers or laptops as resources that can be used at home.

## CONCLUSION

The proposed framework for ICT related teacher professional development - the $C^2RHOAR^3FS^2R^2$ heuristic for ICT implementation and integration in schools - encompasses the need for competent, caring, enthusiastic and knowledgeable facilitators who can relate to teachers' needs and who can establish learning contexts in which the participants progress at their own pace. Such facilitators would need to work hand-in-hand with a view to initiate reflective practices, provide opportunities for the sharing of ICT classroom experiences, motivate teachers to attend on-going teacher development sessions, help schools secure on-going school-based support, recognize technology leaders at schools, and help teachers secure personal ICT resources. The expectations of the teachers who participated in this study resonate with international expectations of Professional Teacher Development and the findings of research on ICT PTD that have been published over the past two decades. Apart from providing further evidence of the authenticity of the claims, they underscore the complexity of the task for those who aspire to meet the challenge of effectively promoting the use of ICT in schools via PTD.

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