

Association for Information Systems

## AIS Electronic Library (AISeL)

---

UK Academy for Information Systems  
Conference Proceedings 2017

UK Academy for Information Systems

---

Spring 4-5-2017

### ICT in the classroom: a study of diverse aspects (9)

Opeoluwa Aiyenitaju

*Manchester Metropolitan University, o.aiyenitaju@mmu.ac.uk*

Andrew Basden

*Salford University, a.basden@salford.ac.uk*

Follow this and additional works at: <https://aisel.aisnet.org/ukais2017>

---

#### Recommended Citation

Aiyenitaju, Opeoluwa and Basden, Andrew, "ICT in the classroom: a study of diverse aspects (9)" (2017).

*UK Academy for Information Systems Conference Proceedings 2017. 73.*

<https://aisel.aisnet.org/ukais2017/73>

This material is brought to you by the UK Academy for Information Systems at AIS Electronic Library (AISeL). It has been accepted for inclusion in UK Academy for Information Systems Conference Proceedings 2017 by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).



## ICT in the Classroom: A Study of Diverse Aspects

### **Abstract**

*ICT has become ubiquitous in the classroom. This paper seeks a way to reveal 'Down-to-Earth' (DTE) issues meaningful to those using ICT in the classroom. DTE issues are those that are directly meaningful to users, which affect the quality of ICT use, unfortunately, the literature tends, to focus on issues of interest to management, IT suppliers and policy makers rather than users.*

*This research explores a way to reveal the diversity of Down-to-Earth issues, uncover hidden issues, and reveal values teachers hold. An empirical study was carried out of twenty teachers from three primary schools by open interview. The data collected was analysed using Dooyeweerd's aspects based on his philosophy of everyday life.*

*The study shows that literature is a poor guide to which issues are meaningful, and that theories would benefit from taking Down-to-Earth issues into account. It recommends the use of aspectual analysis in policy-making and ICT design.*

**Keywords:** Dooyeweerd, ICT in the Classroom, Teachers, Data Analysis, Down-to-Earth

### 1.0 INTRODUCTION

ICT is everywhere in the lives of people. The introduction of ICT in schools has caused diversity of changes to teaching policy and local authorities. The importance of ICTs is acknowledged among educational organisations and policymakers worldwide (Romeo et al., 2012). The British government advocates: "ICT prepares pupils to participate in a rapidly changing world in which work and other activities are increasingly transformed by access to varied and developing technology" (DfEEa, 1999, p. 99).

ICT provides the opportunities to access varieties of information with varieties of resources every day and also provides the ability to view information from various perspectives and platforms, thereby enhancing the learning environment. These are some of the potentials and contributions ICT offers to education which most teachers value (Romeo et al., 2012; Fu, 2013; Yuan et al., 2013; BESA, 2015).

Despite these benefits, teachers find using ICT very frustrating and problematic. For example, the expectation and actual technical recurring faults during teaching sessions causes teachers to avoid using ICT in their lessons (Cuban, 1999; BECTA, 2004; Nikolopoulou et al., 2015).

In teaching, ICT is ubiquitous; this study is not focusing on ubiquitous computing as in 'hardware in kettles' (Stevenson, 2008) but as in everyday life of people, especially in 21st century classrooms. The term ICT in this study refers to both mobile and non-mobile technology and no differentiation between the two is outlined because primary teachers make use of both and a wide variety of applications (Kumar, 2015; Baran, 2014). This study is not focusing specifically on children's use of technology but all use in the classroom especially by teachers. This paper is particularly concerned with the diversity of issues teachers face and does not make a judgement whether the teachers are right or wrong. It does not concern itself with the learning and teaching pedagogical styles.

Despite the rise in technology with increasing access to computers and mobile devices, the actual use of technology in the classroom remains rare, especially in early childhood education (Gray et al., 2010; Wartella et al., 2013).

## ICT in the Classroom: A Study of Diverse Aspects

This paper addressed the question “How do we tackle the ubiquity of ICT in our everyday lives, especially teachers in the classroom?”. The researcher made use of the Interpretivist research approach and the use of Dooyeweerd philosophy as a conceptual framework and an analysis tool.

### 2.0 LITERATURE REVIEW

In this section, this paper argues that there is a gap in the literature on non-generic treatment of Down-to-Earth issues which are based on diversity, depth and values.

#### **What the Literature Focuses on: High-Level Issues**

The ubiquity of ICT provides the opportunities to access information with varieties of resources everywhere and also provides the ability to view information from various perspectives and platforms, thereby enhancing the learning environment. Due to the various potentials of ICT, UK government have made huge investments and funding to schools to equip all classrooms with ICT facilities and formulated policies that can enhance ICT usage (BESA, 2015). Despite all these investments, the benefits of ICT in Education (ICTE) are still not yet fully maximised due to various issues.

The various ICT ubiquity barriers mostly discussed in the literatures are considered as high-level issues because they are the diversity of impacts ICT can have when in use as it relates to the policy makers, ICT suppliers and the academics in education. The high-level issues discussed in literatures have argued they are essential for a successful use of ICT by teachers in the classroom. These high-level issues differ from the meaningful issues to teachers ‘on the ground’ that takes the teacher’s everyday perspectives that are often overlooked which is known as the Down-To-Earth (DTE) issues (Ahmad et al., 2013).

#### **Non-Generic Treatment of Down-to-earth Issues**

Technology has enabled learning in the 21<sup>st</sup> century, unfortunately teachers are still not maximising fully the potential of ICT due to the issues they encounter in their everyday use. In Information Systems when things go wrong, there is need to tackle the real reasons rather than the expected reasons.

However, there are various reasons why the use of ICT in the classroom has been a challenge. For example, lack of access to computers, lack of trainings, teacher’s lack of confidence and

## ICT in the Classroom: A Study of Diverse Aspects

so much more which are mostly discussed in literatures (Goktas et al., 2013; Hammond, 2014). Yet, when these issues discussed in literatures are attended to, they are treated in too general a way and there is little or no evidence on improvement in ICT use on teaching and learning in the classroom (Liu, 2011; Hammond, 2014). For example, teacher's confidence is a DTE issue, but it is treated as a generic issue of interest to academics rather than being any help in guiding the design or use of ICT in classroom.

There is evidence that when teachers talk about the issues they face using ICT in the classroom, they provide their own interpretations of these issues with respect to their goals (values) and in ways they evaluate learners and the learning process (Alexander, 2010; Osei et al., 2014). Determining the impact of teacher's role in the integration of ICT into classrooms is very important and policy makers ought to take into account teacher's knowledge, skills, beliefs and attitudes (Cuban, 2001).

### **Down-to-earth (DTE) Issues**

Down-to-earth (DTE) issues are of the everyday life situation on the kind of issues meaningful to users as they engage with technology. These DTE issues put into consideration a wider perspective of meaningful issues in the user's daily activities, sometimes these issues might not involve the direct use of ICT; however they indirectly influence the successful integration of ICT in the classroom. These DTE issues are intuitive and can loosely be described as issues that focus on 'everyday' activities of system user and meaningful to those 'on the ground', that is, the direct technology users themselves rather than the researchers, ICT suppliers, academics or senior managers.

Until DTE issues are addressed adequately, the attempt to gain benefits from ICT ubiquity use in education will remain subject to high failure rates. As a result of these DTE issues, the ubiquity of ICT in education is resisted even when it has been accepted.

As earlier emphasised, DTE issues are mostly taken-for-granted or overlooked, because they are viewed as insignificant or not worth our attention (Ahmad et al., 2013). However, it is these DTE issues that affect the success and quality use of ICT and are meaningful to teachers, in contrast to the high-level issues mostly discussed in literatures.

There are lots of meaningful issues to teachers in their everyday use of ICT in the classroom and this should not be ignored. Dealing with DTE issues encourages teachers to use ICT to its optimum level. This is because the overall success of ubiquitous ICT working well within

## ICT in the Classroom: A Study of Diverse Aspects

education is mostly hindered by DTE issues which are often ignored. The literature review showed that it does not deal with DTE issues properly. However, in order to fulfil the research aim, there are three needs to explore.

### 2.2 The Needs of this Study

Discussed below are the needs highlighted in order to fulfil the main research question. In view of this, we will now look at what issues this research needs to address.

#### **The need for diversity**

There is an enormous gap between the theoretical solutions provided to these high-level issues mostly discussed in literatures, and the actual everyday issues users ‘on-the-ground’ encounter with the ubiquity and use of ICT in the classroom. Therefore, it is viable to argue that the various classifications of issues is viewed as being too narrowly restricted to do full justice to the diversity of issues found in different perception in ICT education. Hence, there is a gap to understand the need on handling diversity of issues teachers face using ICT in the classroom.

#### **The need to reveal deep issues**

Deep issues are generally intuitive and tacit because they are of the everyday life of the user (Ahmad, 2011). Polanyi (1966) was the first one to introduce the concept of tacit knowledge and expresses the meaning of the concept as ‘we can know more than we can tell’. Tacit knowledge is the most valuable and significant part of human knowledge that resides in the individual’s head in form of experience, know-how, insight, and so on (Abidi, 2005; Mirza, 2009). Tacit knowledge is seen as an important asset in improving decision making, productivity, organisation learning, serving customers, and so on (Haldin-Herrgard 2000; Selamat et al., 2004).

The main weakness with the various ICT ubiquitous barriers classifications is the limited and narrow perspective, resulting in a rather rigid system once the policies for ICTE are implemented. In view of the above issues, a deep knowledge rather than surface knowledge is suggested to understand the type of issues pertinent to teachers and users ‘on-the-ground’.

To this end, there is a need to uncover the deep issues primary teachers face when using ICT in the classroom. Uncovering the deep issues rather than focusing on the surface issues is

## ICT in the Classroom: A Study of Diverse Aspects

likely to give a more robust understanding of the everyday ubiquitous issues faced by teachers in ICT use.

### **The need for revealing values**

Values can be described as an individual's sense of right and wrong or what "ought" to be (Singh, 2015). The value teachers place on the usefulness of new technologies is essential, as this will make it easier to acquire related skills and implement educational technologies in the classroom (Ma et al., 2005). A majority of authors have classified values into different forms. One criticism of the literature is that the interpretation of values in technology education presented by authors is not sufficient for improving teacher's understanding in using ICT in classrooms, neither does it provide clear guidelines for development of their practice (Pavlova, 2002) therefore it is important to understand teacher's values towards educational technologies.

### **Gap this paper fulfils**

In reference to the various classifications of issues as earlier discussed, it has been agreed that sometimes these issues are not directly related to users and other times the issues that are directly related to users are not well classified. It is rational to believe values are diverse and incorporated in various ways. There is need to reveal what is described as values by literatures and by primary teachers using ICT in the classroom. The diversity of issues from 'everyday' of both practice and research is rich and full of surprises, many of which are often overlooked. Hence, there is a gap to understand the need on handling diversity, depth and value of issues teachers' face using ICT in the classroom.

The subsequent section justifies the use of a framework that takes all the research needs into account separately from each other and not reduced to each other.

## **3.0 CONCEPTUAL FRAMEWORK**

There is a need for a conceptual framework that can handle diversity, reveal deeper issues and help understand values that drive research and practice in ICT education.

The conceptual framework used in this study is provided by the Dutch philosopher, Herman Dooyeweerd. A particular aspect of Dooyeweerd's has been applied to the field of Information Systems (IS) by several authors to help reveal diverse issues (Eriksson, 2001;



## ICT in the Classroom: A Study of Diverse Aspects

Bergvall-Kreborn et. al., 1996; Winfield, 1996). Eriksson (2001) showed how Dooyeweerd's aspects helped to reveal some ignored issues. Winfield et. al., (1996) proposed that better knowledge, that is deep knowledge rather than just surface knowledge can be elicited if a multimodal approach to the elicitation process is used. This multimodal approach is based upon the philosophy of Dooyeweerd. These authors specialised in Dooyeweerd's notion of irreducible aspects, and that is the part this study focuses on because it provides philosophical grounds for understanding and managing diversity in everyday experience and its help to avoid overlooking important factors (Basden, 2008). Another significance of choosing Dooyeweerd's aspects is that it considers the everyday activities which cover all aspects of human functioning. It focuses not only on a particular or certain aspects but rather considers all aspects to be important and meaningful.

Dooyeweerd aspect understands use of ICT (in classroom) as multi-aspectual functioning of humans with objects (ICT), in relation to other humans (children) in a subject-subject relationship. This functioning is many aspects simultaneously, where aspects are ways in which activity is meaningful.

Basden (2008) has identified three engagements between users and ICT in this functioning: with the interface and the technology, with meaningful content and with life using these. It is in life that the use of ICT in the classroom becomes either problematic or beneficial.

Aspects are spheres of law, Dooyeweerd's aspects provide a set of basic types of 'Good' and 'Evil' that are irreducibly distinct (Brooke, 2006). They are normative in human activity. Each sphere distinguishes what is good or bad, right or wrong, beneficial or detrimental, blessing or problem and so on. All aspects have values. Human living is multi-aspectual, that is, all aspects apart from the earliest aspects are normative. Therefore the multi-aspectual approach can fully explain what it means to be human.

Dooyeweerd (1955) produced a suite of fifteen aspects that are meaningful in everyday experience, which cannot be reduced to each other. In analysis, this implies that each aspect should be taken into account separately, and none may be overlooked (Clouser 2005). The meaning of each aspect is expressed briefly in the following table.

## ICT in the Classroom: A Study of Diverse Aspects

Aspects	Kernel Meaning
Quantitative	Discrete amount
Spatial	Continuous space
Kinematic	Movement
Physical	Energy + mass, forces
Biotic/Organic	Life functions + organisms
Sensitive/ Psychic	Sense, feeling, emotion
Analytical	Distinction, conceptualization
Formative	Achievement, construction, history, technology
Lingual	Meaning carried by symbols
Social	'we': relationships, roles, convention
Economic	Frugal management of resources
Aesthetic	Harmony, play, enjoyment
Juridical	Due: responsibilities + rights
Ethical	Self-giving love, generosity
Pistic	Vision, aspiration, commitment, belief

**Table 1.** Suite of Aspects (Basden, 1997; Aspects)

Moreover, aspectual analysis of DTE approach is not about compiling a list of issues but recognising normativity that is the difference between good and bad in all situations. There are beneficial or positive repercussions from functioning in line with the laws of aspects and detrimental or negative repercussions from going against the laws of the aspects. That each aspect contains its own distinct norm provides a means of studying teachers' values, in terms of what kinds of thing they feel are good or bad, to be aspired to or avoided. For example, the aesthetic norm of harmony as good and classroom-chaos as bad was found to be a strong value among teachers. This view of normativity is useful in understanding success and failure in Information System use (Basden, 2008). This provides a nuanced way of researching values.

Ahmad & Basden (2013) developed a technique using Dooyeweerd's aspects for studying DTE issues, which is used in this research as further elaborated in the analysis section.

### 4.0 RESEARCH METHOD

The researcher needed to position herself with the research aim because reality is socially constructed (Thomas et al., 2014) and both the participants and researcher will interpret their social world in terms of the meaning given to the nature of the research problem. The aim is to discover and possibly gain a rich and holistic understanding of the diversity of issues by investigating the view of the teachers.

To gain a picture of DTE issues that are meaningful in the everyday experience of using ICT in the classroom, interpretive research was carried out, which (a) interviewed teachers, (b) analysed DTE issues mentioned in literature.

In-depth interviews were conducted with twenty primary school teachers from three schools in Salford, Manchester, across subjects and year groups. There was no gender restriction as both male and female participants were included in the interview. The use of open-ended questions during the interview helped explore the topic deeply and produced a rich account from each participant (Saunders, Lewis & Thornhill, 2003).

The researcher did not involve participants in the use of aspect, as Winfield (2000) had done, but instead asked questions based on what interviewees had said, in order to encourage them to open up. She was sometimes intuitively aware of in which aspects made what she was told meaningful, and might use this intuition to gently guide the discussion away from over-emphasised aspects (e.g. technology: formative aspect) to others that the interviewee had earlier mentioned (e.g. Ofsted: juridical aspect).

The interviews were recorded and transcribed into text, which was then analysed using Dooyeweerd's suite of aspects as a conceptual tool, as described below.

To obtain data about DTE issues from the literature, ten papers were selected as a sample of those that demonstrated some experience of ICT in the classroom. The whole text of these papers was then scrutinized for issues relevant to ICT in the classroom, and these were similarly analysed by aspects. One was a book, which was not available to the researcher, so we relied on the selection of 'look-inside' pages that the Internet offered us and analysed those.

## 5.0 Data Analysis

The substantial amount of data derived from interviews presents a challenge to reduce into meaningful conclusions (Easterby-Smith et al., 2012). Both interview transcripts and excerpts from literature were analysed with the use of Dooyeweerd's aspects. Dooyeweerd's aspects are a good conceptual tool for analysts because they offer a way to identify and separate out meaningful issues, which is philosophically grounded and does not undermine their coherence in everyday experience (Basden 2008). Using them, we can reveal tacit knowledge. For example, Eriksson (2001) used Dooyeweerd's aspects to disclose reasons for unexpected failure of a new ICT system, while Winfield (2000) used them to probe deep expertise.

### 5.1 Method of Analysis

The method of analysis of interview transcripts was as follows. Each transcript was read line by line, doing two things.

1. Direct answers to the questions asked were separated from other useful information voluntarily given ('extra information volunteered': EIV). In the following example, the interviewee switches from direct answer to EIV and back again twice, indicated by '|':

Question: "Do you have problems using these resources?"

Response: "Erm, personally I don't, | I wouldn't say I am an expert with computers but I know what I am doing. I did train as a technician; I have computer qualifications so I know what I'm doing when I use a computer. | There are always problems with computers as they don't always do what you want, they decide to turn off at the wrong point ... | it's just a tool, that extra thing to use in the classroom along with the other stuff to help the children get them interested."

2. Units of meaning were identified by reference to Dooyeweerd's aspects, to identify meaningful issues. A unit of meaning might be a short phrase like "... not enough computers ..." (economic aspect makes this meaningful) or several sentences. For example,

The question is motivated by the formative aspect, i.e. about problems. The mention of 'resources' (economic aspect) is secondary.

## ICT in the Classroom: A Study of Diverse Aspects

The direct answer "Erm, personally I don't [have any problems]" is formative, matching the question-aspect.

The utterance about expertise and training is formative aspect.

The utterance "it's just a tool" has the emphasis on 'just' rather than 'tool', which indicates the teacher's belief (pistic aspect).

The utterance "to help the children get them interested", about helping, is ethical aspect.

We can see that the EVI is richer than the direct answer, with more aspects that are important.

A challenge when analysing with Dooyeweerd's aspects is that most utterances exhibit many aspects intertwined, and it is a matter of judgement to decide which were most important to the utterer -- but usually this is clear if the analyst asks themselves, "What made them say this rather than keep silent or put it another way?"

In the subsequent analyses, only the EIV was used. This helps to reduce bias introduced by interviewer's questioning.

In analysing the literature excerpts, the text was treated as all EIV and analysed with aspects in a similar way to find out what made each issue meaningful.

Such aspectual analysis of transcripts and papers both reveals the diversity of DTE issues, especially as meaningful to users, and uncovers many DTE issues that otherwise would be overlooked ('hidden issues'). Since, to Dooyeweerd, each aspect is inherently normative in a different way, values can also be studied.

The issues were then collected together under each aspect and subjected to quantitative and qualitative analysis.

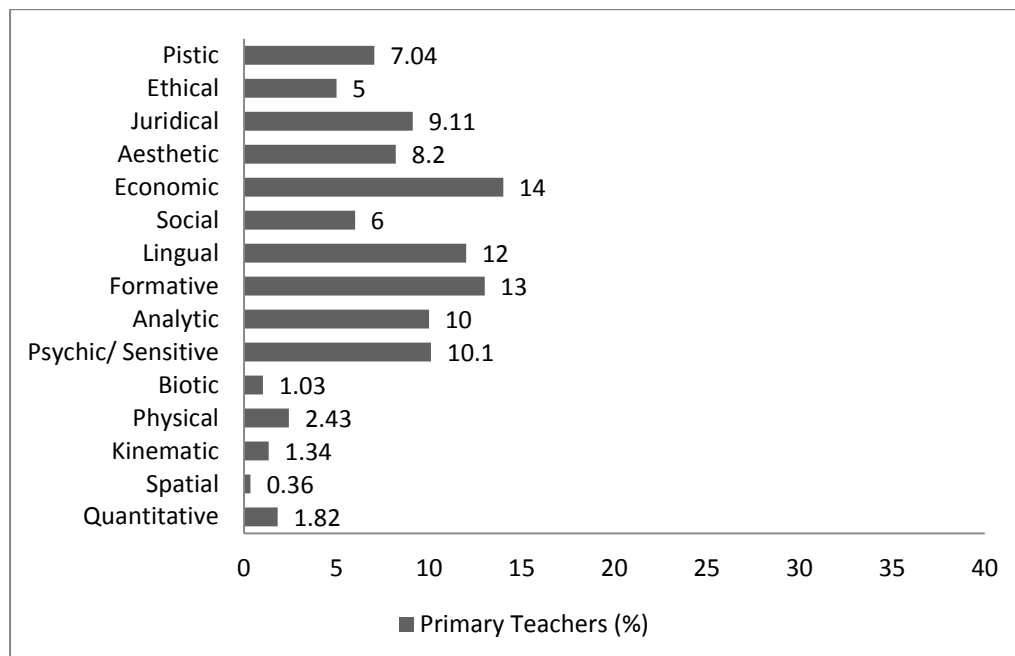
## 5.2 Quantitative Analysis of DTE Issues

The number of issues identified that are meaningful in each aspect is shown in Table2 for both users (EVI only) and literature.

ASPECTS	Users count	Users (%)	Literature Count	Lit. (%)
Quantitative	30	1.82	3	1
Spatial	6	0.36	2	0.5
Kinematic	22	1.34	-	0
Physical	40	2.43	-	0
Biotic	17	1.03	-	0
Psychic	166	10.1	41	12
Analytical	162	10	28	8
Formative	208	13	33	9.3
Lingual	194	12	49	14
Social	97	6	16	4.5
Economic	223	14	126	36.1
Aesthetic	135	8.2	6	2.1
Juridical	150	9.11	26	7.4
Ethical	81	5	5	1.4
Pistic	116	7.04	18	5.1
Total	1647		353	

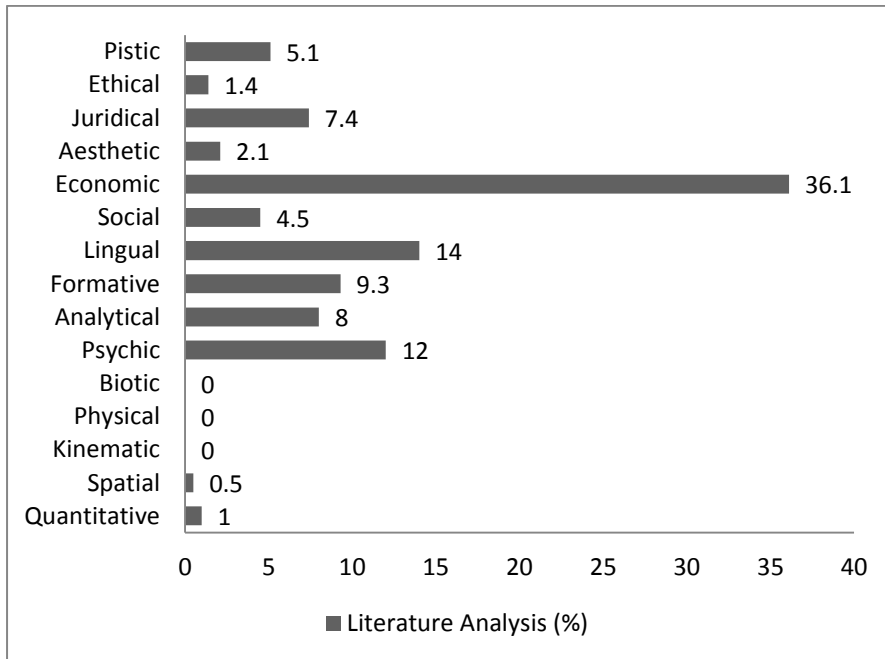
**Table 2. Frequency Table**

The percentages are shown visually in the following bar charts.



**Figure 1. User's Bar Chart Illustration**

## ICT in the Classroom: A Study of Diverse Aspects



**Figure 2. Literature Bar Chart Illustration**

Aspectual analysis involves noting the ways in which each aspect expresses itself in the situation being analysed. This mode of analysis helps to reveal the most and least emphasised aspects, which is, aspects that are overlooked and emphasised, often seeking balance. Also, it shows the aspects the primary teachers (participants) found meaningful and this can be used in practice, for example, in staff training. Also, it helps reveal the profile of meaningfulness, that is, the aspects on which issues are more meaningful than other issues. Therefore, thinking aspectually can help avoid category error in our thinking and analysis.

The aspectual profile above reveals a number of interesting findings.

1. The literature we studied showed a very marked interest in the economic aspect, above all other aspects. By contrast, the interest of users was much more evenly spread.
2. The users showed some interest in early aspects (e.g. spatial arrangements and movements) while the literature completely ignored these.
3. The users found aesthetic and ethical issues meaningful, while none of these were found in the literature studied.
4. Both users and literature found most other aspects meaningful to some extent, though interest in the social aspect was lower than we might have expected, with primary-school teaching involving social relationships with children and parents.

## ICT in the Classroom: A Study of Diverse Aspects

These results raise questions of why these are the case. Finding 4 raises the question of whether the types of issue that are meaningful in each aspect are the same. This can be answered by qualitative analysis.

### 5.3 Qualitative Analysis of DTE Issues

Within each aspect, issues were grouped by standard coding techniques (Saunders et. al., (2003) to identify different ways each issue is meaningful in each aspect. These types were compared between users and literature.

This was particularly useful in two main ways. One was to compare types of issue in aspects that both users and literature found reasonably meaningful. For example:

- Formative aspect in literature: technical faults, lack of technical support, technical skills. Among users: these, plus how ICT hinders creativity, achievements, and how they are constantly faced with technical problems and laziness.
- Juridical aspect in literature: appropriateness, pressure, quality and policies. Among users, some of these, plus denial of what is due, legal matters, undue enforcement, security, low standards, fear of authority and so on. An example of the latter is found in one utterance:

"...subconsciously, I might go- 'oh, I need to have this on my computer because someone is coming in to watch..."

The other was to understand what is meaningful to users in aspects that are neglected by the literature. For example:

- Aesthetic aspects among teachers: misfit, ensure the work integrates, assuming simplicity, harmony/chaos and so on. One teacher remarked:

"...if things go wrong in the mean time you either have to put up with it..."  
(Aesthetic- chaotic behaviour among students when teachers need to sort out technology that goes wrong).

- Ethical aspect among teachers: ethicality of organisation or information, sacrifice, selfishness, hospitality, self-centredness and so on. One teacher explained,



## ICT in the Classroom: A Study of Diverse Aspects

"...one poor friend typed in chess, very innocent, there's nothing wrong with chess and she got naked women wrapped around chess as the first thing that came up, that was a bit of a problem..." (Ethical- Unethical content)

This analysis shows clearly the diversity of impacts ICT can have when in use- not just managerial or technical, but personal, social and juridical. The issues primary teachers have were not just on the formal aspects: such as ICT competence, trainings and technology integration but on the everyday life experiences that are of wide diversity. The richness of aspect has helped to reveal and not overlooked the varieties of issues primary teachers face with ubiquitous ICT usage.

The varieties of issues found by the DTE approach are important because it is the primary teachers who are immersed in the everyday usage of ICT in the classroom, including all its nuances, and taken-for-granted assumptions. These DTE issues might need to be reviewed by all stakeholders in order to make ICT in primary schools a success.

This paper reveals that the kind of issues found by the DTE approach are not only more numerous than with conventional approaches, but also of different kinds, giving a richer and wider picture of IS use.

### 5.4 Overview

By aspectual identification of issues and subsequent qualitative analysis, the diversity of DTE issues is revealed. Deeper issues are uncovered by two things. One is by seeking to identify why each utterance was made (which aspect made it meaningful), rather than just the semantic meanings of words used. Such reasons are often not voiced explicitly by interviewees but may be uncovered by cautious, sensitive aspectual analysis. The other is that qualitative analysis within aspects and comparison of types of issue helps to uncover issues that the literature has neglected.

Aspectual analysis of DTE approach is not about compiling a list of issues but recognising normativity that is the difference between good and bad in all situations. That each aspect contains its own distinct norm provides a means of studying teachers' values, in terms of what kinds of thing they feel are good or bad, to be aspired to or avoided. For example, the aesthetic norm of harmony as good and classroom-chaos as bad was found to be a strong value among teachers. This provides a nuanced way of researching values.

### 5.5 Limitations of the Study

This study has been conducted in the Salford, in the Northwest region of England, among relatively disadvantage communities. They also reflect the issues of these primary schools, and might not be taken as issues in other primary schools. Results might be different if data was collected from more primary school or from other communities in Salford.

The research has been carried out in according with Klein & Myers' [1999] principles of interpretive field studies, as follows:

- Principle 1, hermeneutic circle: The issues are identified in the context of Dooyeweerd's aspects, which are 'global' in their meaningfulness (Basden 2008), and yet the researcher's understanding of each aspect grew through the study, and she reinterpreted some of the utterances later in view of this.
- Principle 2, contextualisation: See above on context.
- Principle 3, research-participant interaction: The direct answers to questions were filtered out and extra volunteered information (EIV) was analysed.
- Principle 4, abstraction, generalisation: Dooyeweerd's aspects are the most abstract things we encounter, and all meaningful issues are related to them, but retain their individuality.
- Principle 5, dialogical reasoning: The researcher's original expectation that ICT is unmitigated benefit in teaching became modified by findings.
- Principle 6, multiple interpretations: Multiple interpretations of an issue are revealed by aspectual analysis, not only between different people but within each individual.
- Principle 7, suspicion: Aspects provide a basis for understanding what is meaningful to participants, underneath what they say, and to help them consider issues taken-for-granted.

## 6.0 CONTRIBUTIONS AND RECOMMENDATIONS

This section discusses the contributions, recommendations and conclusions of this study.

**When literature is used to gain an overview of the field, it does not get a good overview.**

This paper has examined the contemporary approaches and the types of classification of teachers' ubiquitous ICT use and suggests that the claims made for the issues of teacher's ICT use in the literature does not have a comprehensive overview but of a narrow focus. This research has shown that the sample of literature in ICT in education studied here seems to focus on the economic aspect at the expense of other aspects especially the aesthetic and ethical aspect. This narrow focus of issues can propagate through the research community if the issues discussed are mostly based on what previous researchers feel is important and current researchers use these same issues without critically evaluating in their own studies what might be meaningful to the actual users who use ICT. This paper argues that the current literature on teacher's encounters with ubiquitous ICT use is misleading as a guide to practical evaluation or further research. This study can help literatures on ubiquitous ICT education widen their focus and take all aspects into account.

**Theories need to be developed to take into account of Down-to-Earth issues**

This paper recommends that ICT theories need to be reviewed or developed to take into account some other aspects, so that issues on the aesthetic, ethical, social aspects and so on, are not down played. Technology Acceptance Model (TAM) illustrates this point clearly, it was developed to judge the acceptance and usage behaviour of IS use with two internal beliefs, Perceived Ease of Use and Perceived Usefulness (Davis, 1989). These two beliefs show that its focus is on the system and is task related. These are restricted mainly to the formative and perhaps economic aspects of IS use. Although Davis expects them to be expanded by 'external variables' no guidance is given to ensure that those variables cover all meaningful issues in all aspects.

Researchers are constrained to focus on the narrow view of issues derived from the use of existing theories which are limited in the range of aspects. Is it not high time to try another approach to consider a wider perspective and understand the diversity of issues users encounter with ICT use? This paper recommends a Down-to-earth (DTE) approach which gives a deeper understanding of the needs and everyday issues that are meaningful to the

## ICT in the Classroom: A Study of Diverse Aspects

users, and outlines a method by which this might be accomplished. Either this method can be used by researchers to identify the types of issue in each aspect that the theory could incorporate, or the theory could itself warn that all aspects should be considered in relation to its more general constructs.

### **On policy-making**

Policy in education and elsewhere must now take account of the ubiquity of ICT in everyday life, and recognise the constraints and abilities ICT gives. Policy-makers need to review the interesting implication of DTE issues for future policy and from the user's perspective rather than assume the narrow view and influence of commercial providers, management or academic journals. The narrowness of the latter has been demonstrated above. So policy makers should put into account the deep and meaningful issues users encounter in their everyday activities with ICT rather than play them down. A recommendation to the policy makers is to find a way to consider the DTE issues of teachers with wider strategic goals.

Karlsson et al., (2012) revealed the gap in existing policies of users' participation and citizen empowerment and the need to involve users in the process of policy implementation. User participation, however, cannot solve all the problems, because of tacit knowledge or the tendency of discussants to focus on 'acceptable issues'.

The aspectual analysis method described in this paper is able to uncover depth and helps to focus on aspects that are not being talked about or the deeper issues that are often overlooked, as well as revealing the diversity of issues that might be meaningful.

This research might therefore contribute to a deeper understanding of ICTE policy formation. It can provide the basis for developing an everyday adaptive policy and practice. Here are two examples of ICT problems caused by policy, which were uncovered by the aspectual analysis of down-to-earth issues,

*'...we can sometimes get a block on them that's one problem we do encounter, particularly if there's a part of the word that maybe-- for instance looking up the word sexton which is to do with a church caretaker [sexton] but because it's got 'sex' in the beginning of it, that will filter and that would stop...'*

*'...sometimes doing things that you want to look at really is a very great annoyance that you can't get through purely maybe there's a fraction of the word or a slight meaning that Salford has decided is not acceptable, whereas something we are trying to look at is very harmless to the word we are trying to get to...'*

### **The design of software and the installation of ICT in the classroom should be guided by aspectual analysis**

Many DTE issues that are crucial to the success or quality of ubiquitous ICT in Education are overlooked by literature. Hence, the design of software and the installation of ICT in the classrooms should not be governed too much by discourse in the literature but by the everyday issues that are likely to occur, which can be revealed by aspectual analysis.

Also, for both design and policy in ICTE, values are important because they reflect an individual's sense of right and wrong or what "ought" to be (Singh, 2015). For instance, in technical design, technical culture, social values, aesthetic ethos, and political agendas, and so on of the designers must be examined. This study's ability to uncover the values teachers have will help with policy and design, since they create the future of ICTE.

The DTE approach recognises the entire range of meaningful issues, including those that are overlooked by the analyst or not clearly stated by the users themselves. For example

*'...Too often the machines are updating and a couple of hours still on updates, you can't get on...'*

*'...we've got new technology which is not as simple to use as the older technology was...'*

Such issues, important in everyday experience with ubiquitous ICT, are seldom taken seriously by designers or management, yet they can significantly affect the effectiveness of the activity that the ICT is supposed to serve.

## **7.0 CONCLUSION**

In summary, this paper sheds new light on ways it can help theories, policy-making and ICT design handle diversity, to widen their focus and take all aspects into account in order to understand the challenges of ubiquitous ICT in an everyday setting like the classroom. This study offers some important insights into uncovering the deeper issues that are often overlooked and helps to reveal values held by ICT education designers and policy makers.

Only if we get these issues right can we really ensure that teacher's activities with technology results with a good typically learner driven.

Therefore this paper recommends that the use of aspectual analysis helps to handle diversity, uncover depth and values.

Many other sectors have similar challenges of DTE issues and this approach might also be applied to anywhere in any sector in the everyday life of people.

## **8.0 FUTURE RESEARCH**

The methodology employed in this study and the discussion of results is indicative of the kind of issues that might come up when a more detailed study is explored. A future study investigating DTE issues of teachers using ICT in the classroom from more primary schools and other communities in Salford would be very interesting.

## REFERENCES

- Abidi, S.S., Cheah, Y.N. and Curran, J. (2005). A knowledge creation info-structure to acquire and crystallize the tacit knowledge of health care experts. *IEEE Transactions on Information Technology in Biomedicine*, 9(2), 193–204.
- Ahmad, 2011, Down-to-earth issues in (mandatory) IS use: part II approach to understand.
- Ahmad, H., Basden, A. (2013). Down-to-Earth Issues in Information System Use. Proceedings of the Pacific Area Conference on Information Systems (PACIS). Paper 191.
- Alexander, E. (2010). A successful child: early years practitioners' understandings of quality. *Early Years*, 30, 2, 107–118.
- Baran, E. (2014). A Review of Research on Mobile Learning in Teacher Education. *Educational Technology & Society*, 17 (4), 17–32.
- Basden, A. (1997). Aspects of Reality as We Experience It. [Online], Available at: <URL: <http://kgsvr.net/dooy/aspects.html>>. Accessed (23<sup>rd</sup> June, 2014).
- Basden, A. (2002). A Philosophical Underpinning for ISD, ECIS, Poland. [Online], Available at: <URL: <http://is2.lse.ac.uk/asp/aspecis/20020002.pdf>>. Accessed (23<sup>rd</sup> June, 2014).
- Basden A. (2008). Philosophical Frameworks for Understanding Information Systems. IGI Global Hershey, PA, USA.
- British Educational Communications and Technology Agency BECTA (2004). A review of the research literature on barriers to the uptake of ICT by teachers. The BECTA Review 2004. Coventry: BECTA.
- BESA (2015), “Market Research. BESA: ICT Use in schools 1991 – 2015”, Available at: <URL: [http://www.besa.org.uk/sites/default/files/his2015\\_0.pdf](http://www.besa.org.uk/sites/default/files/his2015_0.pdf)>
- Brooke, C., (2009). *Critical management perspectives on information systems*. Routledge.
- Clouser, R. (2005). The myth of religious neutrality: An essay on the hidden role of religious belief in theories (2nd ed.). Notre Dame, IN: University of Notre Dame Press.
- Cuban, L. (1999). The technology puzzle. *Education Week*, 18 (43). Available at: <URL: <http://www.edweek.org/ew/articles/1999/08/04/43cuban.h18.html>>
- Cuban, L. (2001), *Oversold and Underused Computers in the Classroom*, Harvard University Press, Cambridge, MA.
- Davis, F.D. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology, *MIS Quarterly*, 13(3), 319 – 340
- DfE, (1999). Department for Education, The programmes of study for information and communication technology. London: Available at: <URL: [http://webarchive.nationalarchives.gov.uk/20100823130703/http://curriculum.qcda.gov.uk/uploads/ICT%201999%20programme%20of%20study\\_tcm8-12058.pdf](http://webarchive.nationalarchives.gov.uk/20100823130703/http://curriculum.qcda.gov.uk/uploads/ICT%201999%20programme%20of%20study_tcm8-12058.pdf)>. Accessed in 12-set-2014

## ICT in the Classroom: A Study of Diverse Aspects

- Dooyeweerd, H. (1955). *A new critique of theoretical thought (Vols. I-IV)*. Jordan Station, Ontario, Canada: Paideia Press. (Original work published 1953-1958)
- Easterby-Smith, M., Thorpe, R., & Jackson, P.R. (2012). *Management research*. 4<sup>th</sup> Edition Sage.
- Goktas, Y., Gedik, N., Baydas O., (2013). Enablers and barriers to the use of ICT in primary schools in Turkey: A comparative study of 2005–2011. *Computers & Education* 68, 211-222
- Gray, L., Thomas, M., & Lewis, L. (2010). Teachers' use of educational technology in US public Schools: 2009 (NCES 2010-040). Washington, DC: National Center for Education Statistics, Institute for Education Sciences, U.S. Department of Education. Available at: <URL: <http://nces.ed.gov/pubs2010/2010040.pdf> Accessed 30.01.13.
- Hammond, M., (2014). Introducing ICT in schools in England: Rationale and consequences. *British Journal of Educational Technology*, 45(2), pp.191-201.
- Haldin-Herrgard, T., (2000). Difficulties in diffusion of tacit knowledge in organizations. *Journal of Intellectual capital*, 1(4), pp.357-365.
- Fu, J.S., (2013). ICT in education: A critical literature review and its implications. *International Journal of Education and Development using Information and Communication Technology*, 9(1), p.112.
- Karlsson, F., Holgersson, J., Söderström, E., & Hedström, K. (2012). Exploring user participation approaches in public e-service development. *Government Information Quarterly*, 29(2), 158-168.
- Klein, H. K., & Myers, M. D. (1999). A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems. *MIS Quarterly*, 23(1), 67-94.
- Kumar, S., (2015). Teaching Tools and Media Competencies for a 21<sup>st</sup> Century Classroom. *Indian Journal of Applied Research*, 5(11), 140-142
- Liu, S. H. (2011). Factors related to pedagogical beliefs of teachers and technology integration. *Computers & Education*, 56(4), 1012-1022. Available at: <URL: <http://www.sciencedirect.com/millennium.lib.ntust.edu.tw/science/article/pii/S0360131510003507>
- Ma, W. W., Andersson, R., & Streith, K. O. (2005). Examining user acceptance of computer technology: an empirical study of student teachers. *Journal of Computer Assisted Learning*, 21, 387-395.
- Mirza, R. S. (2009). Knowledge management and clinical framework for cross country healthcare organizations. *Master, Department of Interaction and System Design, Blekinge Institute of Technology, Sweden*.
- Nikolopoulou, K. and Gialamas, V. (2015). Barriers to the integration of computers in early



## ICT in the Classroom: A Study of Diverse Aspects

- childhood settings: Teachers' perceptions. *Education and Information Technologies*, 20(2), pp.285-301.
- Osei, C. D., Larbi, E., & Osei-Boadu, Y. (2014). Multidimensional barriers to information and communication technology adoption among senior high school teachers in Ghana. *International Journal of Education and Research*, 2(12), 389–396.
- Pavlova, M. (2002). "Teaching" values in technology education: A critical approach for the theoretical framework. Centre for Technology Education Research. Griffith University
- Polanyi, M. (1966). *The Tacit Dimension*. London: Routledge
- Romeo, G., Lloyd, M., Downes, T. (2012) Teaching teachers for the future (TTF): building the ICT in education capacity of the next generation of teachers in Australia. *Aust J Educ Techn* 28(6):949–964
- Saunders, M., Lewis, P., & Thornhill, A. (2003). *Research methods for business students* (3rd ed.). London: Prentice Hall Financial Times
- Selamat, M. H., & Choudrie, J. (2004). The diffusion of tacit knowledge and its implications on information systems: The role of meta-abilities. *Journal of Knowledge Management*, 8, 128–139.
- Singh, J.D., (2015). Values Inculcation in the Prospective Teachers. *Chakoli Educational & Social Development Society, Dholpur (Rajasthan)*, p.43. [Online], Available at: <URL: [http://kamalnishtha.org/wp-content/uploads/2016/01/Chatena\\_2015\\_FIXEDVERSION.pdf#page=43](http://kamalnishtha.org/wp-content/uploads/2016/01/Chatena_2015_FIXEDVERSION.pdf#page=43)> (Accessed 24<sup>th</sup> June, 2016)
- Stevenson, O., (2008). Ubiquitous presence, partial use: The everyday interaction of children and their families with ICT. *Technology, Pedagogy and Education*, 17(2), pp.115-130.
- Wartella, E., Blackwell, C., Lauricella, A., Robb, M., & Schomburg, R. (2013). Technology in early education: Findings from a survey of early childhood educators. Report for the Fred Rogers Center, Latrobe, PA. [Online], Available at: <URL: <http://www.fredrogerscenter.org/blog/how-early-childhood-educators-use-technology-in-the-classroom/>> (Accessed 29<sup>th</sup> October, 2013)
- Winfield, M. J. (2000). *Multi-Aspectual Knowledge Elicitation*. Unpublished PhD, University of Salford, Salford.
- Yuan, L., & Powell, S. (2013). MOOCs and open education: Implications for higher education. Bolton: University of Bolton, Centre for Educational Technology, Interoperability and Standards & JISC. Available at: <URL: <http://publications.cetis.ac.uk/wp-content/uploads/2013/03/MOOCs-and-Open-Education.pdf>