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Teachers' Interpretations of the Internet. An Applied Case Study for the Evaluation of Technological Frames of Reference

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Abstract. In 1994 Orlikowski and Gash articulated Technological Frames of Reference as a systematic theoretical lens to examine technological developments in organisations. A decade later, in 2004, Davidson and Pai expressed concern that while the lens was widely cited in academic discourse, the incidence and adoption of the model as an analytical framework for socio-cognitive analysis and interpretation of Information Technology in organisations was very low.

As Technology Frame Research becomes more meaningfully applicable with our ever increasing attachment towards technology, I present a case study with the aim of augmenting research in the field. By employing a qualitative methodological framework based on technological frames I evaluate interpretations on the Internet embraced within a group of teachers before the implementation of the technology on campus.

Emerging data suggests how appropriated traits and embedded inclinations towards a technology justify the predisposition of diverse interpretations by one person reminiscent to the context it is being articulated in.

Keywords: appropriation, contextualisation, enactment, internet, interpretations, organisations, socio-cognitive implications, technological frames of reference.

1. Introduction and Motivation of Study

Technology has always been an active ingredient in human progress. While advances in technology are suggestive to the acquisition of new forms of behaviour, technology has never been so central and indispensable to modern living as it is now. With our life styles progressively becoming more intimately entwined with technology, it is not uncommon for us users to experience a mixed sense of awe, concern and yes, why not, an ever increasing sense of giddiness as we are constantly being exposed to a dizzying array of new products promising to supersede those already owned and still being acquainted to. Unfortunately as we are being assured that each new technological newcomer will make life easier, there is always the chance that the design of a technology can become remote and alienated from a user's everyday experiences (Grint and Woolgar, 1997; Orlikowski, 1992). It may not be surprising if the successful outcome of implementation

or even demise of the technology can be directly linked to user perception and meaningful interpretation in context of employment. Therefore understanding how organisational members make sense of the technology implemented and how their interpretation will influence the actions they take with respect to the technology in question is crucial to its development and use (Tadesse Mengesha, 2008).

A socio-cognitive analytical lens referred to as Technological Frames of Reference (TFR) developed by Orlikowski (1992), and, Orlikowski and Gash (1994) is in my opinion a flexible and therefore a powerful tool that may be used to analyse interpretations individuals have on a technology that is being directed towards them. TFR tend to be widely cited and therefore popular within academic circles but several thinkers in the field expressed concern that notwithstanding popularity, the incidence and adoption of the theory was very low (Puri, 2006; Davidson and Pai, 2004; Sahay *et al.*, 1994). While abundant citation can readily be associated with the attractiveness that the theory holds, reference does not logically equate to actual application. Consequently this may lead to "ritual citation" (DiMaggio, 1995, p. 395) and a "theory as slogan" approach (DiMaggio, 1995; Davidson, 2006, p. 24) where the appropriation of an idea eclipses its implementation in authentic research. Therefore within this framework I present a case study that describes the state of affairs surrounding the introduction of Internet facilities in 2009 at the largest Post Secondary Institute in Malta. In the process I augment awareness and literature in the field of socio-cognitive research by applying TFR as the analytical lens. In the process I elucidate individual and shared interpretations a group of teachers teaching Physics at post secondary level gave the Internet, virtually on the eve of its introduction on campus.

The paper is thus organised as follows. I firstly give an overview of TFR that I will be using as my theoretical backdrop. I secondly describe the context within which research was carried and then move on to illustrate the methodology adapted to define and evaluate the nascent individualised Technological Frames. Finally I interpret data and provide conclusions according to the adopted theoretical lens.

2. Theoretical Backdrop

Technological Frames of Reference identify their roots on the premise that people act subjectively on their own accord. Borrowing from socio cognitive realms, TFR relate to discourse grounded into the perception of reality and enactment of behaviour (Berger and Luckmann, 1967). While reality is recognised as a quality that is independent of one's own will, people still tend to be subjective on the way they perceive things. The way one person looks at and interprets reality may be very different from that of another. This subjective mode of interpretation does not only exert a direct control on the way people filter things but also on the way they enact new forms of behaviour with the eventual accepted reality being constructed on shared notions and social negotiations (Davidson, 2002; Orlikowski and Baroudi, 2002).

Frames may be attributed to 'schema' (Barlett, 1932; Neisser, 1967) or elements of established reality that actively guide the conduct of life (Berger and Luckmann, 1967).

Frames are flexible. While they shape and control peoples' actions they tend to operate in the background and being reminiscent of taken forgranted traits, they discreetly influence actions observed at organisational levels (Davidson, 2006**,** 2002; Orlikowski and Gash; 1994)**.** From the micro-perspective point of view and tapping from thinkers like Argyris and Schon, Kuhn, and Sheldon they attribute frames to "mental models" and "paradigms" (Orlikowski and Gash, 1994, p. 176). Gioia (1986) states that: "[. . .] frames refer to definitions of organisational reality that serve as vehicles for understanding and action." and

> They include assumptions, knowledge and expectations, expressed symbolically through language, visual images, metaphors and stories. Frames are flexible in structure and content, having variable dimensions that shift salience and content over time. They are structured more as webs of meanings than as linear, ordered graphs. (p. 50).

The web-like characteristics that Gioia (1986) uses to endow frames with, complements the meta-theoretical implications of frames such as proposed by Porac and Thomas (1989). Porac and Thomas (1989) portray human activity as an ongoing input-output cycle (p. 398) where the subjective interpretation of external reality becomes exemplified through behaviour. This perpetual observational-interpretive-outcome process will eventually generate universal interpretations by several people transcending from the one to the many to become socially reinforced in the world (Porac *et al.*, p. 1989, p. 399).

While in a more generic form, frames incorporate mental models that people use to relate to an issue or situation, technological frames are defined by Orlikowski and Gash (1994) as:

> [. . .] that subset of members' organisational frames that concern the assumptions, expectations, and knowledge they use to understand technology in organisations. This includes not only the nature and role of the technology itself, but the specific conditions, applications and consequences of that technology in particular contexts. (p. 178).

In this case Orlikowski and Gash (1994), shift their attention to issues on sensemaking of technologies. They give importance to the intuitive user who in the process of actualising a continuous recursive dialogue with the structural properties of the technology; can potentially give rise to new forms of interaction other than those the technology was initially conceived for (Orlikowski, 2000). Therefore while the actions of end users at the micro level can influence the outcomes of the technologies at the macro level, the parameters of interpretive flexibility within which the users involved decide to appropriate and enact behaviour of a technology will have a direct effect on the success or demise of the technology involved. But what are the elements that influence the decisions that individuals take about a technology?

Orlikowski and Tyre (1994) state that time is a very important ingredient for the formulation and the reformulation of frames. Then again this issue is very much related to the notion of technology-in-practice that I make reference to in later stages. Rather, in my research I follow two interrelated routes. I firstly focus on the frames that people have on the Internet prior to the introduction of the technological infrastructure in the largest postsecondary institute in Malta. Secondly, I engage to a methodology with the intent of providing an insight on how to harness the power of the analytical lens of technological frames to study perceptions and interpretations people have on the technology.

3. Contextualisation and Research

In Malta the educational system is compulsory for everyone up till the age of sixteen. Maltese children attend primary school between the ages of 5 and 11. They then attend secondary school up to the age of 16. Students can then opt to look for employment or else further their studies at post compulsory levels such as vocational institutes or general post-secondary/post compulsory institutes. If desired and after achieving stipulated academic levels, they can choose to further their studies to tertiary level at the University of Malta which incidentally is the sole university in the Maltese archipelago.

The study presented here was implemented late in 2008 in the Department of Physics at the Gan Frangisk Abela Junior College, commonly referred to as the Junior College or JC in short. Out of 4940 students (NSO, 2008) attending a compulsory post secondary institute in 2008, 3024 of them were regularly registered at the named institute making it the largest post compulsory school on the island. The research delved into the Technological Frames on the Internet embraced by a group of Physics lecturers teaching Advanced level Physics just before the technology was introduced on campus.

While the department readily procured ICT equipment for use by the teachers in class, Internet facilities were still absent from the institute. At the time of carrying out the research, the department was equipped with two mobile digital projectors that could be utilised in conjunction with the laptops during lectures and presentations. Refurbished computers were utilised in conjunction of data loggers during practical sessions that students performed weekly in the labs. DVD, TV and VHS facilities were also present. Except the head of department, none of the lecturing staff had a desktop PC installed in their office. Still, many of the lecturing staff (18 fulltime) in the department either had their own personal laptop or could easily avail themselves of any of the two available ones.

Over time, the lack of Internet facilities at the college started to manifest itself as a common concern for all the staff in question. It was quite customary for staff members to lament that lack of Internet facilities meant that they could not access their emails and could not use the Internet at the work place. On previous occasions there had been various instances where it was speculated that Internet facilities were to be introduced on the premises, but they never materialised until March 2008. In March it became ‘unofficially’ official that works on the setting of an Internet infrastructure were to start. Works continued all the way through the summer and when the lecturers went back to work in September they were welcomed by a readily available and functioning broadband platform. For me this presented a very unique situation to study embraced technological frames regarding a technology independently implemented from user decision or control. While on one side the ICT availability allowed the academics to familiarize and even conceptualise pedagogical implications, the eventual presence of the Internet, while anticipated, would have been a novelty. Taking it from one of the male respondents commenting about the issue: “The Internet is being introduced with a bang. I must admit that I am not prepared for it.” Thus it was interesting to evaluate the meaningful interpretations that the Internet enacted within the context of their mundane activities and professional practice.

4. Methodology and Concepts

The methodology employed was qualitative in nature and relied on interviews. All interviews were recorded in their entirety on a recorder. Each interview lasted approximately two hours. Using TFR as a theoretical lens, the readiness of the individuals in question towards the application of the technology in educational settings could be evaluated a priori to the actual implementation of the technology. Orlikowski and Gash (1994) argue that "[. . .] by examining key actors' taken-for-granted notions of technology we can gain much insight into how technologies are developed, used and changed [. . .]" (p. 175). Ultimately, while looking for similar or divergent traits that ran in the interpretations of the Internet in the group, the examination used was not based on preset considerations. Rather, it relied on a form of content analysis where the emergence of data dictated the setting of the analytical parameters.

To elicit these taken-for-granted impressions towards the technology in question, the interviewing model I decided to adopt was based on semi structured questions. With interpretivism continuously in focus, I considered that the best way to 'dig' into the meaningful interpretations that the interviewees had and gave to the Internet and its place in their life was through interviewing via unstructured/semi-structured interviews. No preset or subjective considerations were taken. Instead, the technique employed relied on a form of adaptive content analysis. Beyond the leading opening questions the interviewing style relied more on open ended questions that brought forth the interviewees' point of view rather than premeditated considerations. Taking it from the standpoint held by Taylor and Bogdan (1984) the unstructured or qualitative interview "[. . .] is flexible and dynamic" (p. 77). A technique that emphasised face to face communication was taken to be more adapted to elucidate those subtle nuances usually associated with opinions, perspectives and meaningful interpretations respondents held with respect to the medium and that eventually were considered to surface as an integral part of their attitudes and behavior with respect to the technology. While questions were initially set in English, to ensure that respondents expressed themselves properly, they were allowed to speak and articulate themselves freely in English, Maltese or in both languages. Recorded interviews were then transcribed. Each transcript was thoroughly examined, for salient or suggestive words, phrases or sentences that could be used to elicit information and shed light on personal interpretations and reflections towards the internet. Subsequently, traits observed were sorted in loose or approximate preliminary categories or groups as inspired by the theoretical parameters conceived by Orlikowski and Gash (1994). Borrowing from Wittgenstein (1953), Orlikowski and Gash (1994) consider that individuals share frames if "[. . .] some core cognitive elements assumptions, knowledge and expectations are similar" (p. 177). The emergent data in each category was then thoroughly examined. Through repetitive re-examination of the transcripts, common patterns or themes (usually characterised by salient words and/or phrases) that could possibly be utilised to create domains of categorisation were identified.

While the notion of Technological Frames resonates throughout all the research methodology, the setting up of themes was not premeditated. Rather it was based on

a form of content analysis were surfacing traits dictated the characteristics of themes obtained. Once the themes and the domains of categorisation were branded, re-examination and recoding enabled all the data to be accordingly classified into more distinct core domains that include qualitative frameworks or structures identifiable by specific traits observed in the interpretations of the interviewees. Finally after classifying all the replies from the interviews according to the set domains, the data in each domain was inspected and as part of the analytical exercise the identification of similarities, divergences or inconsistencies in technological frames between individuals in the same group was implemented.

5. The Analytical Tool

"[. . .] the greater problem [. . .] is not how to get data but how to figure out what to do with the data [. . .]" (Wolcott, 1994, p. 9). In any form of analysis, one way of doing something with data is to describe an account and stay as faithful as possible to the way the data was recorded. As exemplified in Fig. 1 below, the analytical exercise was composed of two parts. The first part incorporated the categorisation of data that included promising excerpts from the interviews in domains. The data in the domains was then evaluated with a Description Analysis Interpretation (DAI) model as proposed by Wolcott (1994) from which technological frames were identified. Briefly, the 'Description' part included a very faithful report of the observations made and statements taken during interviewing. The description of data collected in the domains was therefore treated as fact. In the

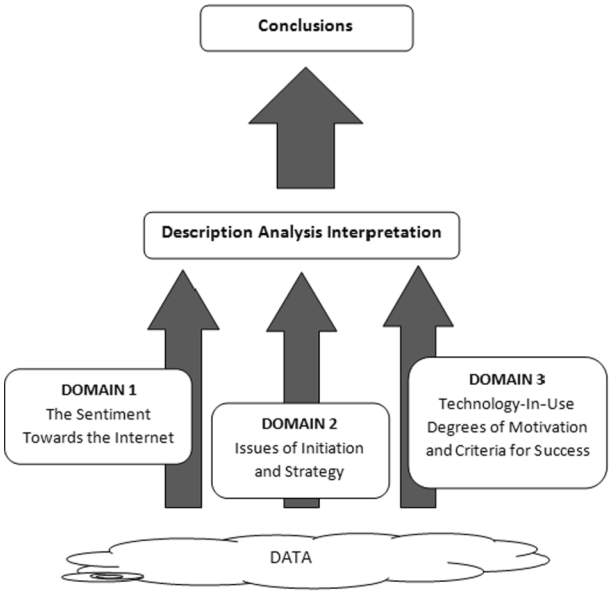

Fig. 1. Portrayal of method used for the processing of data to results.

intermediate phase; the analytical part; the description of facts was then extended and expanded beyond the descriptive part, systematically identifying key factors, traits and relationships that could eventually undergo interpretation. Therefore in the 'Analysis', the data was systematically segregated into groups according to emerging traits or patterns of classification. Finally in the 'Interpretation' part, emergent patterns defined by the domains were contextually processed and interpreted according to the theoretical lens exemplified in TFR.

The problem of turning such qualitative data into an authorative written account never fades away (Wolcott, 1994, p. 10) and choices made can always lead to further debates. In context of such issues the DAI approach adapted was in my opinion as close as I could get to remain loyal to observations.

The following excerpt from the study exemplifies and highlights how the DAI processing tool was therefore applied:

DESCRIPTION. *It was observed that those involved do not use the Internet in class but use it a lot at home.*

ANALYSIS /DEDUCTION. *Internet use is related to accessibility.*

INTERPRETATION (using the theoretical lens of technological frames). *Issues in accessibility caused users to contextualise and interpret the use of the Internet differently.*

a. The Domains of Categorisation

The domains of categorisation had the purpose of offering a framework for the classification of data by grouping and defining interpretations elicited according to common or shared traits observed. They can also be referred to as frames of reference because they make data more relevant, providing meaningful interpretation for specific technological frames. Though adopted from Orlikowski and Gash (1994) the constructed domains of categorisation were more context specific. This substantiates the views of Orlikowski and Gash (1994) themselves who stress that: "[. . .] frames are likely to be time- and context-dependent, and always more valid when examined in situ rather [. . .]" (p. 184), than when they are assumed beforehand. Thus, nascent empirical results allowed the domains of categorisation to finally crystallise into three as follows:

i. The Sentiment Towards the Internet

This domain related to the hidden and generic assumptions, perceptions, opinions and expectations that the respondents held with respect to the nature and potential capabilities of the Internet. This domain emerged under the premise of identifying the inclinations the respondents had with respect to the Internet. Orlikowski (2000) distinguishes between the structures embedded in the technology (that include the qualities the technology is endowed with by the designer) and those that arise through human action and referred to as emergent structures, or technology-in-practice (Orlikowski, 2000). The meaningful relations the respondents gained through habitual use of the Internet provided insight into the perceptions the respondents came to embrace on the mentioned technology.

ii. Issues of Initiation and Strategy

By the setting of this domain I evaluated how much the teachers considered their actions in the use or referral to the Internet in educational settings as vital in influencing students' perception to the technology. Placing things in the Maltese context, in 2008 the Government of Malta had issued two ICT policy strategy documents: The Smart Island. The National ICT strategy for Malta 2008–2010 and the Malta's e-Learning Strategy 2008–2010. With enhanced interest on ICT use in the classroom both documents were directed towards the setting of a much required paradigm shift leading to a more productive use of ICT, the reduction of the digital divide and the setting of an ICT oriented society as a major driver in our service based economy.

"[. . .] structure and action constitute each other recursively" (Orlikowski and Robey, 1991, p. 147). I believe that the classroom provides a rich space and opportunity where cultures meet and merge together. If it takes two to tango, then even in the theory of technology and frames there are processes of negotiation that as they take place between the different humans, they can enact new modes of behaviour, meaning and identities. Orlikowski (1999) herself recognised that people sharing a common interest or goal can actively manipulate a specific social condition. Thus the shared interpretations originating between people at the micro level can potentially bring about the restructuring or reformulation of a specific social habitat, eventually influencing certain macro-organisational aspects of society at large.

iii. Technology-in-Use. Degrees of Motivation and Criteria for Success

"An important aspect of using the technology is to know enough about it so as to appropriate and manipulate it effectively" (Orlikowski and Gash, 1994, p. 188). This domain was characterised with initiatives and motivations the users were undertaking in the adoption of the technology in question. It was characterised by interpretations that dealt with the employment and the articulation of the Internet in their personal and professional sphere. It took in consideration the way the Internet was being currently used and focused on the motivations the users had in creating new forms of behaviour and activities around the technology.

When Orlikowski (2000) notions the concept of technology-in-practice, she distinguishes between the technology as the artifact and its interpretation during use, between its appropriation and the ways new activities are being enacted or elicited from its application. While the appropriation of a technology is based on what is expected from it according to its physical makeup, the running interpretation and use will be related on how it is actually being used and which in all respects may even be different from the reasons of its initial appropriation. Thus an important premise in this domain of categorisation or analytical tool, involved the evaluation of the relation the respondents gave to the Internet when seeing it in context of their mundane and professional activities. By seeing how, where, when and why the respondents were making use of the Internet, the type of meaningful relation or technological frames they came to embrace with respect to

the Internet could therefore be elucidated. Finally through this domain the respondents' understanding of how the technology might have been availed of on a day to day basis, could be evaluated, providing an insight into the degrees of customisation and satisfaction that were being acquired from use.

6. Description and Analysis of Data

In this section the general outcome of results are presented. This will be followed by a summary that includes the description and analysis of observations according to the domains of categorisation set and mentioned further up.

i. Synopsis of Results

The respondents included seven males (denoted by an alpha numerical symbol M#) and seven females (F#). While two were aged less than thirty, the majority, nine in all had an age that varied between thirty five and forty nine years of age. Three were older than fifty.

From the data elicited it was observed that all interviewees considered the Internet as playing an integral part in their lives, they also expressed mixed feelings and a guarded attitude on its capabilities. At home it was used for work and leisure and all were capable of taking calculated risks in downloading software and performing online transactions. They easily merged their mundane activities with the Internet and in certain aspects they considered the medium as either indispensable or playing a very important role in their life. They also admitted that unrestrained use and lack of control from their side could potentially lead to a lot of wasted time.

A distinction between contextualising internet use at home and at work and which will be interpreted later on, was discerned. The respondents never saw the use of the Internet as unreachable or daunting. Noticeably the respondents possessed enough working knowledge that allowed them to fluently articulate notions of the Internet in a generalised and de-contextualised manner. Still none of them admitted to possess enough practical knowledge or 'knowledge of procedure' (Giddens, 2004) that made them articulate ways of employing the medium in teaching situations. This could imply that they lacked pedagogical knowhow and found it difficult to conceptualise its application in educational settings. As a matter of fact while they exhibited varied degrees of proficiency in its generic applications including modalities of communication, none of the respondents expressed confidence or knowhow on using it in class. Their replies on queries related to the pedagogical implications of the Internet tended to be vague. Some said that they could use it during lecturing but then again admitted that they would prefer to use it in smaller tutorial or seminar groups. There were others who did not see any scope in including the medium in their lecturing/teaching activity but opted to refer their students to chosen Internet sites.

> I am not using the Internet in class because with Internet missing at work I am not that well familiar on how to go about it. [. . .] I am currently referring students to the

> Internet at large, referring them to specific sites that I have visited or else I refer them to specific video clips that I have seen on You tube (F5).

What follows is a summary of results according to the domains of categorisation made further up.

a. The Sentiment Towards the Technology

The respondents focused on the technical capabilities of the Internet. None showed any predisposition towards Web2.0 applications that usually appeal to a more active user who is more inclined to online activities based on participation and contribution. Rather they were more inclined to visualise the Internet as a source for referencing and therefore taking a more passive role of spectators. They were also more likely to contextualise the Internet in their personal life rather than work.

> I find it very useful when looking up things with my children for their home works and projects, like accessing pictures and finding interesting links and sites that could be used in their home works (F1).

> The Internet provides me with vast possibilities to look up information and help my children with their homework (M2).

> I find it very useful especially to check things online before I actually buy them [. . .]. Now I also use it to read journals electronically that before I used to buy, like the New Scientist (M1).

Perceptions on traits regarding advantages and disadvantages of the Internet were balanced or neutral with inclinations towards a reportage style or academic definition. Again responses that evoked elements of participation or that placed the user in a position other than a passive receiver were absent.

> [. . .] it characterises the era we live in (F3).

> The internet has become a very valuable tool, but like everything else it has its minuses as well (F4).

> [. . .] a great invention (F5).

> (The Internet) [. . .] has revolutionised the world without a lot of noise (F7).

> (It is) [. . .] one of the major inventions of our time (M6).

> [. . .] can be useful, but it can also be a likely source to a lot of wasted time (M7).

While none expected the Internet to bring immediate change at work it was anticipated to facilitate administrative tasks.

> [. . .] it facilitates the way I do things (M2).

> [. . .] if I have a couple of hours between lectures I can access my emails here (at work) (F7).

> [. . .] it can help you do research everywhere at home or at work (F6).

> It takes off the load of doing the work at home (F2).

Similarly, all considered the Internet an appendage to be used as dictated by the user.

> It is not enough that the Internet provides me with loads of things. I have to see how I can use it during my lectures. In the class you have to be the one. You have to be able to deliver (F3).

> The Internet is a tool (M3).

> The Internet is a very important tool in the hands of its user (M5).

b. Issues of Initiation and Strategy

In this domain I saw that replies portrayed the interpretations that the users had on the importance of the Internet on a wider scale but that rarely touched their personal sphere. Orlikowski and Gash (1994) ponder on the importance of examining notions, ideas and attitudes that are usually taken for granted but that allow people to make sense on a much larger scale. These provide very important insights on how issues that also include implementations manipulation and outcomes of technologies are changed and bring about change in organisations.

While acknowledging accessibility issues and the potential for the technology to transform the way the government related with the people, several of these respondents were not able to relate things beyond their personal necessities. None of the respondents saw any link or relevance between the use of the Internet in training and education and the welfare of economy. While most of the respondents only had a vague idea of governmental policies, there were those who had not even heard of them. Two were vaguely aware that two months before the interviewing exercise two Internet-related strategies were issued. None of the respondents knew that one of the Strategy documents, the smartlearning strategy (MIT&I, 2008) was specifically directed towards teachers themselves. Some of the respondents had a vague idea that the Internet was being offered at reduced prices to first time users. Others knew that some initiatives regarding PC and Internet literacy programs were carried out at local councils and schools, but none knew what these initiatives entailed:

> Umm. . ..I think that some time ago there was something that involved the provision of Internet and a computer to every household (F1).

> Yes. I did hear something in the media. I was not really interested though. Unless it influences me directly then I will not read about it. When it comes to Internet penetration and home computing I have both so I was not really interested to delve into such issues (M6).

Based on the respondents' replies, answers in this domain could therefore be grouped into two broad categories. Those that dealt with interpretations related to *ease of accessibility* and *cost cutting* issues and those that took in consideration the *empowering properties* of the technology at national levels.

From an *accessibility* and *cost cutting* point of view, the respondents speculated that the government wanted to reduce people on its payroll by setting readily available services online that would require less manpower in the offices:

> Having the Internet would reduce long queues and waste of time. Probably and primarily the goal is of reducing people working in the government sector (F2).
>
> I think that the government is taking these initiatives to reduce bureaucracy and reducing queues. Even from an egoistic point of view, the government would benefit from its inclusion. It would reduce bureaucracy and people will grumble less and the government will look better in the eyes of the citizens (M2).
>
> One day a time will come where the amount of workers will be re-dimensioned/reduced, reducing red tape enhancing efficiency and reducing cost (M7).

Two recognised the *empowering* and *enabling* properties of the technology.

> We are a small nation and do not have natural resources. [. . .] I am suspecting that by offering high quality human resources we might attract new investments [. . .] in Malta we have a lot of people that are PC savvy and when it comes to human capital we can offer a lot (M1).
>
> I assume efforts are being done to ensure that Malta will become technologically at par with other countries. [. . .] having people that are ICT literate would be very important as it would ensure that more companies would be attracted to set up trade centres in Malta. Considering that we do not have any raw material then it would be one of the ways of obtaining work for our country and enhancing our economy (F5).

None of the respondents related the setting of an Internet based network at work to the line of policies that the government was abiding to. Rather, it was a situation directly related to college needs and priorities:

> [. . .] it is all based upon what the administration dictates. Other necessities have always pushed the setting of a network down the list of the college's needs (M3).

All in all the link between the initiatives to bring a paradigm shift in ICT use at societal levels and the setting of an Internet based network on campus was only vaguely conceptualised by the respondents. Mostly were not even aware or interested on these initiatives. None conceived that their active use of Internet applications in educational settings and in class could be related to students' perception of the technology.

c. Technology-in-Use. Degrees of Motivation and Criteria for Success

The absence of Internet at JC gave rise to mixed feelings regarding pedagogic use.

> Internet is being introduced with a bang. I must admit that I am not prepared for it (M6).
>
> [. . .] I would feel the need to learn more before I use it (F1).
>
> Everyone has got his or her own limitations. So if I am not capable of using it then I will not (F6).
>
> If I were to use it in class I will need to know more about it (F7).

As expressed further up most of the users were familiar with the Internet but they were either vague or reluctant to talk about how they can meaningfully relate it to their work.

More than resisting in trying to employ it at work as part of lectures they were concerned on their lack of preparation on how to go about it.

> One needs time. I have never used it during a lecture so I cannot really comment on the outcomes of use it during a lecture. I really do not know (F2).

> I am not using the Internet in class because with Internet missing at work I am not that familiar on how to go about it. [. . .] presently what I am doing is referring students to the Internet at large or else referring them to specific URLs or You tube (F5).

> I am sure that there are many ways how I can include it in my lectures. I still have to see [. . .] I find no problem that others who use it better than I know would help me out (F7).

> I cannot really imagine using the Internet during lecturing. When taking in consideration the amount of explanation that our discipline (Physics) entails I cannot really see how I can fit it in. Maybe a little for demonstration, but I cannot see it as a widespread practice. I would prefer hands-on activities with real apparatus. But if one is using high voltages or apparatus that are not readily available then yes it can be of some good (M2).

> In my situation I will have to see what methods are available for teaching and then develop my own methods (M4).

7. Interpretation of Results

Patterns that have emerged from the interviewing exercise are now summed up.

A shifting sense of perceptions can be perceived as the embedded structural qualities of the Internet were appropriated by the respondents to recycle or enact new forms of interpretations. The distinct scenarios of Internet availability at home and its complete absence at work had a direct effect on the respondents' Technological Frames and contextualisation of the technology in question. I consider the home environment as the crucible for an attitudinal development of the respondents' interpretations on the technology. It offers fertile grounds where experience brought in by the different members of the family could merge and evolve into new perceptions. In the same instant, the diversity offered by the freedom of use at home blocked out the respondents' capabilities in contextualising the Internet in a place where they had no control in its implementation. Noticeably, the respondents furnished the Internet with interpretive meanings that were directly related to the backdrop it was discussed in. There is nothing unusual about it especially when the activities performed varied according to location. Still, when considering that Internet applications allow for both synchronous and synchronous activities it is interesting to note that none of the respondents envisioned a scenario of linking Internet use from home to the workplace and vice versa.

Incidentally this issue will lead to another important point. Most of the respondents offered strong arguments about the importance of integrating the Internet in their lifestyles. In their own way, they all recognised and enthusiastically appropriated the embedded qualities of the technology in their personal activities. The extent of appropriation of the

embedded characteristics of the technology allowed the respondents to then enact wide-ranging and varied forms of applications that included reservation of holidays and online shopping, extensive use of government services and Internet banking applications. But that is where the emergence of new structural rules stopped. Saying it differently the appropriation and enactment of the new structural interpretations of Internet use did not go beyond their personal sphere. None envisaged how their use of the Internet could bring about an attitudinal change in the way the students they taught looked at the technology. As a matter of fact none of the respondents related their use of the Internet with the students. This was quite interesting as most of the respondents were parents who actively supervised what their children were accessing online.

From a pedagogical perspective, this could be attributed to an interpretational vacuum or lack of meaningful appreciation. While they actively appropriated the use of the technology at home they could not relate and bring about the same behaviours formed through practice to bridge into the classroom environment. In context of the working environment, the respondents' resolved to comment on the logistic use of the technology. They all believed that the Internet could bring a positive change to the working environment. Comments focused on administrative work including enhanced modes of communicability for handling and sharing of assessment marks, remotely accessing departmental notices and reduction in the use of paper. Still what was a recurrent issue was the lack of the pedagogical implications and unwillingness in extending arguments of valid Internet application to the classroom environment.

From the impartiality of an outsider this recurrent conscious or unconscious reluctance of articulating the Internet in a pedagogical setting can be defined as resistance, for me it was alienation. Giddens (2004) proposes that structural properties are mediated through the dimensions of facilities, norms and interpretive schemes. Likewise, "In social life, actors do not enact structures in a vacuum" (Orlikowski, 2000, p. 409). As organisational studies suggest, "[. . .] people tend to approach the new in terms of the old" (Orlikowski and Gash, 1994, p. 23). If the absence of the Internet at the place of work had dictated the interpretive inclinations of the respondents so it was only natural that as able professionals they had managed to get along well without it. Therefore they did not even bother to extend its implications in context of their work.

But, "[. . .] use of the technology is not a choice among a closed set of predefined possibilities [. . .]" (Orlikowski, 2000, p. 409). In the Taoist school of thought the aim of '*wu wei*' is to achieve a state of equilibrium. Paradoxically one route would be that of the '*wei wu wei*': "action without action" or "effortless doing" (Wikipedia, 2007). The absence of the Internet at work made the end users enact a new form of structure by doing nothing. In socio cognitive interpretations there are processes of negotiation that as they take place (or not take place) between the human and non human actors, they enact behaviour, meaning and identities. "[. . .] we have people's action that is shaped by, but also recreates because it reinforces, the rules that give rise to or that allow action" (Orlikowski, 1999, p. 4). When Berger and Luckmann (1967) write about reality they say that: "[. . .] specific agglomerations of 'reality' and 'knowledge' pertain to specific context" (p. 20). So, it can be assumed that while habitual use of a technology can re-enact new modes of use, its absence can also galvanize people to act otherwise. "Wait.

We might not have the Internet here but it does not mean that I do not use it at home [. . .]" (F6). DeSanctis and Poole (1994, p. 129), refer to such phenomena as "faithful" and "unfaithful" appropriations of technology. They distinguish between the expected application of the embedded features of the technology in question, and the way that it is actually being used. So while the respondents may have been 'unfaithful users' because they were not using the Internet as a teaching tool in class, the same individuals were 'faithful' enough to appropriate the Internet and enact new forms of behaviour at home. Simply stated, the lack of Internet facilities at work allowed the respondents to recognise that they can get along without it. So at times it is wise to consider that even doing nothing would enact action, and that even the most artifactual technologies can sometimes govern human agency.

8. Implications for Further Research

The inductive strategy adopted to set domains according to emerging traits in the analytical tool proved its worth. The domains of categorisation elucidated were more context specific than those that could have been directly adopted from Orlikowski and Gash (1994) beforehand. While the domains that emerged embody the technological frames and understandings that the respondents had on the Internet, they cannot be seen in isolation from each other. For instance the sentiments that the users embraced with respect to the Internet were directly related to the ways the same technology was put into practice. Therefore, while the domains mentioned tended to be particularly useful in highlighting diverse aspects in the interpretations of the Internet, the domains used may have had common traits that ultimately if considered in isolation of each other can only provide a partial picture of the reality deemed to be assessed and interpreted.

This study may also be regarded as a snapshot into the dynamic recursive process between the embedded structural qualities of the Internet and the enacted and emergent facets of user interpretations. While this investigative exercise may be taken as a working example in the implementation of TFR for socio-cognitive research, it also uncovered traits brought up to scrutiny in the initial stages of an ongoing process of shifting interpretations that modify and change as the context they are taken in changes as well. The source of contextual interpretative inconsistency that has been seen is likely to change as the technology in question is introduced on the premises. Then again initial habits that form in the early stages of implementations can congeal and often embed unresolved problems into organisational practices that through initial routine patterns will be difficult to change (Tyre and Orlikowski, 1994). Thus with this scenario it is strongly believed and understood that further research has to be done with respect to the phenomenon of the habitual use of a technology that in one instant, Orlikowski (2000) deems to be almost indispensable for the emergence of new technologies-in-practices, and in the next takes to lead to the congealment of practices. In fact now that broadband facilities are readily available at JC and the respondents have had the opportunity to experience, weather and familiarize to the continuous presence of Internet facilities at work, it would be interesting to implement a research exercise that employs the same analytical framework that assesses nascent technological frames grounded into practice.

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Kaip mokytojai supranta internetą. Atskiro atvejo metodo taikymas šaltinių technologiniams modeliams sudaryti

Patrick CAMILLERI

Orlikowski ir Gash (1994) aprašė šaltinių technologinius modelius (anglų k. Technological Frames of Reference) kaip sisteminę teorinę priemonę organizacijos technologiniam vystymuisi tyrinėti. Po dešimtmečio Davidson ir Pai (2004) išreiškė susirūpinimą, kad nors šis požiūris plačiai cituojamas akademiniame diskurse, tačiau modelių taikymas socialinei bei kognityvinei analizei, taip pat informacinių technologijų supratimas organizacijose yra labai menkas. Didėjant technologijų naudojimui šaltinių technologiniai modeliai lengviau taikomi, todėl straipsnyje nagrinėjama atvejo analizė šioje srityje. Taikydamas technologiniais modeliais grįstą kokybinį metodą autorius, prieš diegdamas technologines naujoves organizacijoje, bando įvertinti, kaip mokytojai supranta internetą. Gauti tyrimo rezultatai atskleidžia, kaip tinkamas technologijų pristatymas ir taikymas daro poveikį atskirų asmenų prisiminimams.