Technostress & Personality

Factors in the Digital Divide?

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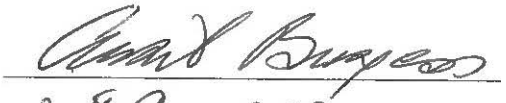
Dissertation submitted as a requirement for the MSc in Cyberpsychology,
Dun Laoghaire Institute of Art, Design & Technology, 2009.

Declaration

This Dissertation is entirely my own work, and has not been submitted previously to this or any other third level institution.

Signed 

Date 20th June 2009

Acknowledgements

I would like to thank my supervisor Ms. Marion Palmer, Head of Department of Learning Sciences in the School of Creative Technologies at IADT, for her advice and forbearance with this work. Both Marion and Dr. Gráinne Kirwan, Programme Co-ordinator MSc in Cyberpsychology, are responsible for opening windows into cyberworlds, previously unknown.

My thanks go also to my colleagues in the National Educational Psychological Services for their support and to the schools, teachers, parents and students for their willing involvement in this project.

I am indebted to my husband Eugene Murray, and our elder sons, Robin and particularly Julian, who despite their exasperation, provided continuing support and practical help. Bevan put up with it all and kept the volume down. Wise man.

Finally, thanks to all my new friends on the 2007–2009 first Masters in Cyberpsychology Course who made the last two years exciting and fun.

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Abstract

The term 'digital divide' is generally explained as a division between people who do, and those who do not, access internet technologies because of economic, social, educational and age inequalities. This quantitative study explored whether other factors, such as technostress and personality, also contribute to digital divisions. School contexts were chosen because of their junction between digitally aware younger people and adults. One hundred and thirteen adults and 164 students in four Irish post-primary schools completed personality and technostress inventories. Findings indicated that adults experienced more technostress than students and that low technostress was associated with high emotional stability. As wired communication becomes a global focus for social, commercial and civic engagement, resulting implications for learning pedagogies are examined.

1. Introduction

Internet technologies have changed information access and communication irrevocably. However, divides exist between those who can and those who cannot use, or access, internet technologies. Further division exists where people make informed decisions not to become technologically involved. However, concerns exist for those who are excluded involuntarily; their lack of involvement in a wired world may increase existing societal inequalities.

How can digital exclusion be explained? Are digital divides occasioned merely by unequal internet accessibility, socio-economic and generational differences? Are other factors involved? Does technophobia or technostress, much discussed in the 1990s, still exist? Could individual personality traits contribute to technostress? If so, do attitudes towards technology and personality traits also contribute to this digital divide?

This paper first examines the growth of internet technologies before exploring global inequalities and concepts of digital divides. Initiatives to combat the negative aspects of digital divides and consequent civic exclusion are outlined. Generational factors and concepts of digital natives and digital immigrants are then explored. The paper then addresses technostress, a negative outcome from dealing with new technologies, and effects of personality traits on digital involvement. Research into technostress and personality traits in the context of four schools is outlined, as schools provide a central meeting point or junction where older people and young digital immigrants interconnect. Data from 277 adults and students in four post-primary schools, obtained from demographic, technostress and personality questionnaires, is examined. Implications of digital divides, and their contributing factors, are discussed with reference to learning pedagogies.

1.1 Internet Development and Growth

So, when did it all start? From the late 1930s computers and intra-computer communication were employed for military and intelligence applications. Later, Turing (1950) and Moore (1965) predicted massive growth of computer memory capacity and processing speed. Their predictions were realized. However, technology experts and commentators differ on the exact start date of the Internet Era and of the birth of digital natives.

Prensky (2001) infers that the fundamental changes, brought about by digital technologies, occurred in the last decades of the twentieth century. Palfrey (2008) contends that people born after 1980 are 'digital natives'; they are a generation that grew up with internet-connected home personal computers. Netlingo, the Internet Dictionary (2009) defines the Internet Era as a time, within the Information Age, when the internet merged with telecommunications and became the communication focus for commercial, consumer, political and media interests. Norris (2001) identifies 1989 as the year that witnessed two major historical events: the fall of the Berlin Wall and the invention of the World Wide Web. She argues that the graphical browser Mosaic made internet technology accessible to non-scientific communities four years later.

Since Netscape and Internet Explorer were released, in 1994 and 1995 respectively, the numbers of people using the internet escalated exponentially. According to Norris (2001), there were approximately 3 million users in 1994 and 26 million in 1995. Norris (2001) maintains the online population doubled every year until 2000. Internet World Stats (2009) indicate that well over one and a half billion people worldwide now use the internet, 23.8% of the world's population.

The prescient Moore (2007) spoke of the limitations of internet growth as happening within the following 15 years. Whatever the predictions, new technologies have radically changed the way in which information and communication is exchanged within the last 25 years. Although the exact start date of the Internet Era is somewhat fuzzy, the ubiquitous access to computer and communication technologies suggests a date in the mid 1990s.

1.2 Inequalities of Global Provision

On a macro-level, global inequalities exist. Not surprisingly, the highest internet market population penetration is in post-industrial world regions such as North America (74.4 %), Oceania-Australia (60.4 %) and Europe (48.9 %). Over half of Ireland's population (58.0 %) are internet users. The lowest internet population penetration at 5.6% is in Africa (Internet World Stats, 2009).

Yu (2006), investigating English language reports on information and communication technologies (ICT) access, contends that internet and global telecommunications provide crucial underlying systems for participation in 21st century society.

As internet penetration grows and migrates to aspects of life such as e-governance, commerce, research, healthcare, creative endeavours, leisure activities and public and private communications, unequal access is one factor contributing to digital divides.

1.3 The Digital Divide

The digital divide has been defined as 'the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities' (OECD, 2001, p.5). OECD (2001, 2008) reports relate that income and education are two key variables in dictating a digital divide, although other factors include household type, family structure, age, gender, racial backgrounds, language and location. However, when income and education are taken into account worldwide, ICT use increases.

Selwyn and Facer (2007) argue that, as technology becomes ubiquitous in the United Kingdom, digital disadvantage is not restricted to those who are excluded socially but besets people in all socio-economic groupings. They contend that renewed policy by relevant stakeholders must address this problem. The issue is made more complex because the term 'information and communication technology' (ICT) is not restricted to computer and internet use. It includes diverse applications across all life contexts.

Selwyn and Facer (2007) maintain that eradication of digital disadvantage must ensure exploitation of the affordances ICT presents. Furthermore, as connectivity now encompasses wireless and satellite technologies in addition to broadband, accessibility must mean that people know how to use these platforms. Selwyn and Facer (2007) contend also that the mere rollout of infrastructural development is insufficient to tackle the digital divide and resulting social exclusion. They argue that new technologies must meet people's expectations and their competency levels in order to be accepted.

Selwyn and Facer (2007) cite Lievrouw and Farb (2003), Yu (2006), and van Dijk's (2005, p.21) ICT models when arguing that ICT equality is situated in societal and cultural contexts. Proficiency, understanding, adequate time and financial resources among users as well as accessible and appropriately delivered content by providers, are key factors in digital equity. Informed choice also plays a part in digital equality where people make an informed decision to opt out, or use ICT selectively. Selwyn and Facer (2007) argue that in order for these conditions to come about, the British government must implement policies which promote access to hardware, software and content, relevant skills and technical support, increase understanding of pervasive ICT and its diverse applications and involve all social groups in extending activities meditated by ICT.

In Ireland too, government policy (2006), as laid out in 'Towards 2016', attempts to address the digitally excluded, across age groups, to increase inclusiveness. Achieving this goal may not be easy. A secondary digital skills divide is becoming apparent as web use increases. Hargittai (2002) argues the existence of a 'second level digital divide' and found that increasing web access did ensure equality of effective use. Dijk (2006) maintains that increasing access was not synonymous with effective digital skills and knowledge of applications. Tufts University (2008) indicates that parents with higher socio-economic status had more sophisticated web search and evaluation skills than lower socio-economic groups. Comfort with the technology was also a factor, particularly with older users (Hargittai, 2002).

1.4 Bridging the Digital Divide: Cyber-optimists, Cyber-skeptics and Cyber-pessimists

Norris (2001) and others refer to cyber-optimists, cyber-skeptics and cyber-pessimists. Norris highlights the mid 1990s stance of digital optimists, such as Gilder (2000), who envisage technology, along with appropriate financial targeting, as providing potential to combat poverty by enabling civic involvement through political online fora, e-voting and virtual communities of interest. Groups such as the Digital Divide Network see closing divides between low income countries and non wired people both as a moral imperative and as a way towards inclusiveness and poverty eradication. Eid (2008) refers to enhancing livelihoods for opening markets and sharing information through ICT. This philanthropic macro stance that bridging the digital divide globally will lead to a fairer world is exemplified by the One Laptop Per Child (OLPC) initiative, instigated by Nicholas Negroponte and the Massachusetts Institute of Technology, and launched at the 2005 World Summit on the Information Society to increase ICT access in low income countries. Gorski (2009) argues that digital equity is crucial for multicultural education.

While cyber-skeptics believe that increased digital access will not affect intrinsically political systems, cyber-pessimists maintain that far from equalizing opportunities, new technologies may accentuate inequalities among countries and in social strata within countries. Democratic divides may become concretized. Norris (2001) argues that digital politics may reduce costs for those politically active but does not necessarily increase civic or political engagement. Those with higher levels of income, education and occupation have greater access to digital technologies, and therefore to civil engagement, as political participation become more technological.

1.5 Age Factors in the Digital Divide

In addition to the disputed macro issues of global and democratic digital democracy, there are issues, pertaining to digital divides, between older and younger people in wired societies. It is not surprising that young people have more chances of being digitally literate. Those born in higher income groups since the rollout of the World Wide Web in 1995 (Norris, 2001) have grown up surrounded by increasingly pervasive technologies. The recent British Office of National Statistics survey (2008) found that 70% of adults over the age of 65 stated they had never used the internet. In contrast, 93% of 16 to 24 year olds had used the internet in the 3 months prior to the survey, as opposed to 65% of the 65 year olds. Mark Prenksy is credited with coining the phrase 'digital natives' to describe people who have grown up immersed in the language and experience of computers and digital video, music and mobile phones (Prensky, 2001). He contends that they learn in qualitatively different ways to older generations. These older generations, or 'digital immigrants', were taught to learn through traditional pedagogies. On the other hand, multitasking and comfortable instant informational access are embedded indelibly in the cognitive expectations of digital natives.

1.6 Do all digital natives share similar positive feelings towards technology?

Can comfort be attributable simply to computer expertise or do other factors impact? Have all demographic groups similar attitudes and behaviours? Do all digital natives or the entire 'Net Generation' (Tapscott, 1998) share similarly positive feelings towards technology? Studies on attitudes towards new technology suggest that other factors, such as technostress and personality traits, must be considered (Korukonda, 2005).

1.7 Technostress – A Negative Aspect of Technological Change

Since the rollout of computer and information technologies there has been considerable research into their effects on people. Visions of global connectedness with unlimited potential for personal and societal growth are darkened by lack of digital access and lack of competence in dealing with technological change. Toffler (1970) argued that fundamental changes would occur as a result of technological innovation. He predicted that accelerating technological and consequent societal changes would lead to people feeling disconnected, disorientated and shocked from information overload.

Brod (1984) also predicted that new technologies would impact fundamentally on people's personal, work and social lives. He described information overload, or technostress, as being an adaptive inability to deal with computer technologies and a fear of change.

Norman (1990, p.31) refers to the 'paradox of technology' where increasing technological functionality brings increasing complexity for the user. In comparing different types of watches, Norman (1990) argues that analogue watches have simple functions, such as setting the time, which can be mastered readily. Digital watches, on the other hand, have multiple functions assigned to each button, thus making them appear more complex to use. Green (2006), in her article 'Unpacking "I Don't Want It": Why novices and non-users don't use the internet', found that the perceived complexity of computers led to unease amongst computer novices and acted as a disincentive to computer use.

Norman (1990) suggests an antidote to technological complexity. This involves hiding, or making invisible, complex functionality to the user until it is required. Brosnan (1998) argues also that until technology becomes invisible, people will be anxious about dealing with its complexity.

The term 'technophobia' was coined to describe negative feelings towards new technologies (Rosen, Sears and Weil, 1992). Weil and Rosen (1997) postulated that 'technostress' was evident even in people confident about technology, because of technological intrusiveness into all aspects of their lives, with damaging health

effects. In addition, Weil and Rosen (1997) argue that people who use computers constantly in work are under great pressure to process increasing tides of information within narrowing time constraints. Brosnan (1998) argues that information overload, along with increased technological speed and complexity, causes anxiety amongst particular individuals. Green (2006) postulated that negative attitudes to technology and technology users were two key factors affecting novices and non-users.

Library staff, academics and students, who deal with information access and management, are of particular interest to researchers on the effects of technostress, or computer related stress. Hudiburg (1997) developed the Computer Hassles Scale to measure computer stress and found that one quarter of students were adversely affected by this phenomenon. Rose and Stoklosa (1998) used focus groups to assess technostress. Kupersmith (1992) attributes technostress amongst reference librarians to information overload, performance anxiety and organizational factors. Eleven years later, Kupersmith's (2003) informal poll of 92 librarians indicated that 59% of respondents felt that their technostress levels had increased over the previous 5 years. Eight percent considered this to be a serious problem while 65% reported that it was a somewhat serious problem. Evidence of technostress was also found amongst academic and non academic staff by Ibrahim, Bakar and Nor (2007).

Findings from other studies indicate that technostress is not restricted to university staff and students. Teachers have also been found to experience stress when using technology in the classroom (Al-Fudail and Mellar, 2008).

But, as Weil and Rosen (1997) assert, technology pervades all aspects of living. Their definition differs from that of Brod (1984) in not classifying technostress as a disease; they describe it as 'any negative impact on attitudes, thoughts, behaviors, or body physiology that is caused either directly or indirectly by technology' (p.5).

1.8 The Personal Technostress Inventory (PTSI)

Rosen and Weil's (1998, 1999) Personal Technostress Inventory (PTSI) attempts to measure this negative impact by combining 47 questions relating to the following 7 types of technostress: learning, boundary, communication, time, family, workplace and societal technostress. A Total Technostress score is computed from answers to all 47 questions on a 5 point Likert scale. Technostress in the 7 individual areas could also be calculated.

In relation to *Learning Technostress*, Weil and Rosen (1997) contend that learning to use technology is made intimidating by poor design, unclear instructions and ungrammatical and jargonistic manuals. Instructors are blamed also for ignoring individual learning styles and not matching their presentations or explanations to individual levels of competency, ease and attention spans. Four questions are posed to ascertain people's comfort in this domain: 1) *I am comfortable using new technology, 2) Solving a technical problem seems like a fun challenge, 3) When technology has problems, and 4) I believe I can fix it.*

Weil and Rosen view technology's intrusiveness as infringing on personal notions of self and autonomy. They suggest that adults become like two year olds who are testing personal boundaries against social norms as they dislodge and re-establish new boundaries. Because machines have limitless potential, people feel coerced into doing more than they need to, or can. Statements include: *I worry if I don't check my messages for awhile, I believe that most people know more about technology than I do* and *I lose track of time when using certain types of technology* attempt to measure *Boundary Technostress*.

New forms of human contact have emerged. Weil and Rosen (1997) view the move from face to face, oral and written postal interactions as potentially threatening for some people. Comforting visual and auditory cues are lessened when receiving abbreviated voice messages, answerphone responses, emails or faxes. Emails can be addressed incorrectly and not arrive, causing frustration. On the other hand, online communication can accelerate relationship development with previously unknown people. Chatrooms provide company at any hour of the day or night. But new cyber-

friends may disappoint if met in real life: their online and actual presentation of self may differ disappointingly. Yet online companionship and always-available access to others can provide alluring 'holding power' (Turkle, 1984), where the sense of real time is lost. *Communication Technostress* statements include such items as *I get distracted by communication technologies like telephones, fax machines, mobiles and pagers, When I leave a message for someone, I worry when I'll hear back from them* and *I feel overloaded by all the messages I need to answer in a day.*

Weil and Rosen (1997) point out one of the paradoxes of new technologies. On the one hand, technology beguiles with its promises of time saving devices. On the other, keeping up with the pace of technology and increased productivity reduces leisure time, they contend, with consequent loss of personal control. Not only does technology encourage multitasking, often beyond human limits to assimilate while managing to work productively, but the concept of the traditional work day has been eroded, exploded and extended, often resulting in burnout. Statements such as *I have enough free time in my life, I find myself interrupting what I am doing to attend to something else* and *I get impatient waiting for technological devices to finish their work* comprise the *Time Technostress* element of Rosen and Weil's Personal Technostress Inventory.

Regarding *Family Technostress,* Weil and Rosen (1997) muse on the impact of new technologies on families, 'The family of the 1990s! We're all in different rooms, each hooked up to our own techno-gadgets' (p.126). They state that television, video tape recorders, stereo systems, cordless phones, video games, 'chatting' and personal music systems add up to individual techno-cocoons (p. 129). Weil and Rosen (1997) argue that multiple technologies contribute to family stress through upsetting the boundaries of family 'togetherness' and 'separateness' and traditional communication and behavioural patterns. *Family members each spend time separately in their home using their own technologies, I believe areas of the Internet are not safe for children* and *I believe that children overuse technology* are PTSI statements relating to *Family Technostress.*

Weil and Rosen (1997) contend that *Workplace Technostress* is another area contributing to Total Technostress. Statements include: *Technology changes so fast it is hard to keep up, Using technology at home interferes with my free time* and *I feel as up to date on technology as my peers.* When Rosen and Weil were writing on technostress in the early 1990s, economic downturns, and technological advances, encouraged the growth of home based businesses and teleworking. In the late 90s, workplace computers became commonplace; email replaced written memos. Weil and Rosen (1997) found that people became stressed by system and computer errors, the time needed to learn how to use computing technology, and its rapid changes. Although vaunted as 'time saving' (p. 178), technological use seemed to take more, rather than less, time. In addition, these technological advances lessen privacy and face to face contact with colleagues, often leading to isolation in the case of home based workers. Rosen and Weil (1997) contend that electronic monitoring in the workplace and information fatigue increase employee stress.

Rosen and Weil (1997) also examine the bigger picture, viewing society as becoming increasingly technostressed. They argue that technological obsolescence decreases people's control; it becomes easier to replace items than fix them. Information overload, difficulties relating to trust of internet related information, increasing techno isolation and the simultaneous build up of personal information on databases, decreasing personal privacy, also adds to technostress feelings. Statements in the *Personal Technostress* questionnaire include: *It seems that when a technological device needs repair, it is easier to discard rather than fix it, Technology isolates people* and *I am concerned about the privacy of technological communications.*

Rosen and Weil's (1997) book on technostress was based on their previous 23 country study of the psychological impact of technology (Weil and Rosen, 1995). Their work in the technostress area reflects *fin de siècle* perceptions of technology in Europe, Asia and the United States. However, it suffers from a common assumption made by technology commentators. While acknowledging that people's perceptions are shaped by cultural contexts, no allowance is made for individual differences within cultures and the role of personality.

1.9 Cyberpsychology Research

As internet use became more pervasively intertwined into the working, social and leisure aspects of people's lives, established academic disciplines such as psychology began to assess its effects on individuals as well as groups of individuals. Through the 1990s and in the first decade of the twentieth century, the new area of cyberpsychology started to impact on all traditional areas of psychological research, such as educational, clinical, consumer and organizational psychology.
This paper now outlines personality, relevant personality theories and how these can be applied to computer anxiety, or technostress.

1.10 Personality Factors, Eysenck

While theories of personality differ, nomothetic trait and type approaches provide the most useful understanding of personality for statistical purposes. Goss (1999) offers a definition of personality as 'those relatively stable and enduring aspects of individuals which distinguish them from other people, making them unique, but which at the same time allow people to be compared to each other' (p. 744).

Hans Eysenck was, arguably, the most influential psychometric psychologist of the twentieth century. Though a behaviourist, his personality theory is based primarily on genetic determinants. Eysenck's hierarchical taxonomy model of personality is composed of Psychoticism, Extraversion, and Neuroticism (PEN) superfactors. Eysenck (1995) postulated that each superfactor comprised several different lower order factors, behaviours and habits. While individual behaviours might change according to context, Eysenck proposed that aggregated traits were stable over time and provided a reliable measure of personality.
According to Eysenck (1995) extraverts experience low levels of cortical arousal and seek external stimulation in order to perform well. Extraverts share characteristics of being outgoing, sociable and talkative. At the other end of the scale, introverts have high levels of cortical arousal and therefore perform better when external stimuli are reduced. Introverts tend to be quiet and reflective.

Eysenck's concept of neuroticism encompasses negative attributes, occasioned by low activation thresholds in the human sympathetic nervous system. People may have difficulties in controlling their emotions, and may be prone to anxiety and depression. Conversely, emotionally stable people have high activation thresholds and are emotionally robust and even-tempered, except in highly stressful situations.

Eysenck's third category is that of psychoticism and socialization. He contended that psychotics tend to be aggressive, easily angered, have low self-esteem and high levels of impulsivity. Eysenck's (1975) Personality Questionnaire (EPQ) was revised in 1985.

1.11 Big Five Personality Model & Five Factor Model

Alternative personality paradigms include the Big Five and Five Factor Models (FFM) of personality. The Big Five Model was initially forwarded by Thurstone in 1933 and published a year later. It is based on a lexical hypothesis: that language captures the key characteristics which distinguish individuals in such a way as to make them identifiable by others. Individual traits are genetically determined and situated culturally. The FFM has gained hegemony over Eysenck's model as the base for psychometric testing, supported by factor analysis of self report questionnaires and peer evaluations in large diverse populations by Costa and McCrae (1987, 1997).

The Five Factor Model describes five broad personality dimensions or factors: Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism (Goldberg, 1990; McCrae and John, 1992). Openness is associated with insight and imagination. Efficiency and organization are linked with Conscientiousness. Features of Extraversion include sociability and high energy. Friendliness and compassion are related to Agreeableness. Sensitivity and nervousness are linked with Neuroticism. In some versions of the Five Factor Model, the term Neuroticism is replaced by Emotional Stability. The five dimensions are not mutually exclusive; clusters may occur and be contextually influenced (Costa and McCrae, 1987, 1997, 1998). Each of the five dimensions is composed of several constituent subfactors.

Costa and McCrae's (1985) NEO PI-R five-factor Personality Inventory is used extensively in personality research. Composed of 240 items, the NEO PI-R measures the five main dimensions and their subordinate facets.

Shortened versions of The Big Five Factor Model became available to suit situations where test administration time was an issue. Gosling, Rentfrow and Swann (2003), and Rammstedt and John (2007) devised 10 item personality measures. McCrae and Costa also revised their 60 item version of the NEO PI-R, the NEO Five-Factor Inventory (NEO-FFI) in 2004.

A single item personality measure (SIMP) was developed by Woods and Hampson (2005). In the shorter versions, the validity of the measure and their test-retest reliability were prioritized. Furnham (2008) indicates that the Ten Item Personality Inventory (TIPI), developed by Gosling, Rentfrow and Swann (2003) has better validity than other short measures.

Gosling's TIPI scale is based on 10 items, comprising dyadic statements. These are rated by the responder using the following 7 point Likert Personal scale, 1) *Disagree strongly,*2) *Disagree moderately,* 3) *Disagree a little,* 4) *Neither agree nor disagree,* 5) *Agree a little*, 6) *Agree moderately and* 7) *Agree strongly.* The statements include the following:

(Extraversion) *Extraverted, enthusiastic* and *Reserved and quiet*
(Agreeableness) *Critical, quarrelsome* and *Sympathetic, warm*
(Conscientiousness) *Dependable, self-disciplined* and *Disorganized, careless*
(Emotional Stability) *Anxious, easily upset* and *Calm, emotionally stable*
(Openness to Experiences) *Open to new experiences, complex* and *Conventional, uncreative.*

1.12 Use of Big Five Model in Technology Related Research

Findings by Anthony, Clarke and Anderson (2000), and Nov and Ye (2008) indicate significant correlations between technological innovation and Big Five personality traits. Heinström (2005) found that personal tendencies impacted on behaviour related to technologies. Heinström used the Big Five personality trait theory to account for differences in digital information seeking behaviour; she found that extraverts were more likely to use wide and flexible broad scanning styles to access information. Korukonda (2007) found that three personality dimensions, Neuroticism, Openness and Agreeableness, correlate to personal experience of computer anxiety.

1.13 Relevance to Current Research

This paper, thus far, has outlined the growth of the internet, digital inequalities and generational divides, technostress and personality models. It now explores to what extent technostress and personality dimensions might be contributing factors to digital divides. It also focuses on possible divides between digital natives and digital immigrants. Schools have been chosen as key junction points where both populations meet and where differences in relation to technology might be examined readily.

This research is unique in its comparison of technostress and personality traits amongst Transition Year students, and associated teachers and adults, in Ireland's East Coast Area of County Dublin and County Wicklow. Transition Year, adopted by most Irish schools, follows completion of the three year Irish State Junior Certificate programme. It is recognized as the first year of a three year Senior Cycle, culminating (generally) in the Leaving Certificate. The Irish Department of Education and Science's rationale for this programme is to provide a broad educational experience for pupils before they proceed to further study or vocational preparation.

The study explores a commonly held assumption about those born into the Internet Era, namely that they are more comfortable with technology than their elders. It is hypothesized that Transition Year students, generally aged between 13 and 17 and therefore deemed to be digital natives, experience less technostress than their teachers (adults). Weil and Rosen's (1998, 1999) Personal Technostress Inventory is used

amongst both populations to calculate Total Technostress scores, and sub scores relating to Learning, Boundary, Communication, Time, Family, Workplace and Societal Technostress.

The study also investigates possible correlations between Technostress and its subfactors and the Big Five personality traits of Emotional Stability and Openness to Experience. The assumption, associated with Emotional Stability, is that people who are confident in themselves are less prone to technostress. Therefore high levels of Emotional Stability are expected to correlate to low technostress levels.

The assumption, that people who score highly on the personality characteristic of Openness to Experience, is tested. It is assumed that high scores on this characteristic will be associated with low technostress scores.

Specifically, the following three hypotheses were tested among 277 students and adults in four post primary schools.

1.14 Research Hypotheses

H1: There will be higher levels of technostress among adults than amongst the student population.

H2: There will be a negative correlation between technostress levels and Emotional Stability factors in the Big Five personality traits.

H3: There will be a negative correlation between levels of technostress and the Openness Big Five characteristic.

2 Method

2.1 Participants

Two hundred and seventy-seven participants were involved in the research, associated with four different types of post primary schools in Ireland's East Coast Area (South County Dublin and County Wicklow). One hundred and sixty-four Transition Year students, 41 male and 72 female, who met the parental and personal informed consent criteria, participated. Forty-seven Transition students in the four schools did not participate. Some did not have signed consent forms (n=41). Of these, 2 sets of parents refused permission for their children to be involved. Absenteeism, (n=6) on the day questionnaires were administered, accounted for the remainder. Students were between 13 to 17 years of age, except for one student who was 18. Of the 113 participating adults, 88 were teachers and the remaining 25 adults were parents. All adults were either teachers, or parents, of participating students.

Students and teachers were identified by school personnel, primarily the Transition Year Coordinators. It was not possible to obtain the exact numbers of non participating Transition Year teachers. Transition Year teachers are described as adults in the findings. They included school teachers, assistants and parents who contributed to the Transition Year programmes.

The four schools involved in the research comprised (a) a fee paying girls' school; (b) a mixed comprehensive school; (c) a mixed community school, and (d) a mixed community college under Vocational Educational Committee (VEC) jurisdiction.

2.2 Materials

Three quantitative questionnaires were used, (1) a Demographic Survey , (2) The Personal Technostress Inventory (PTSI) and (3) the Ten-Item Personality Inventory (TIPI) see Appendices A, B and C respectively.

(1) The Demographic Survey consisted of 8 questions relating to gender, age, education levels, number of technological devices used and broadband access.

Respondents were asked to describe their level of technical knowledge, as perceived by them, using a 5 point scale from *Very Good* to *A Complete Beginner.*

(2) The Personal Technostress Inventory (PTSI), developed by Rosen and Weil (1998), contains 47 items on a 5 point Likert scale (*Never, A Little, A Fair Amount, Often and Very Often*). The statements, phrased positively or negatively, refer to issues about technology that might cause people stress. The PTSI has a Cronbach's alpha of .82, indicating internal consistency. The 47 items combine to give a Total Technostress score. These items also produce seven subscales relating to (1) Learning Technostress, (2) Boundary Technostress, (3) Communication Technostress, (4) Time Technostress, (5) Family Technostress, (6) Workplace Technostress and (7) Social Technostress. An assessment of the PTSI's reliability and validity is appended. The scale has been used frequently by researchers over ten years.

The PTSI form also contained an item on Feelings towards Technology, taken from Rosen and Weil's (1998) demographic questionnaire. Participants were required to choose one of the following statements as best describing themselves: *1) I am eager and one of the first to try new technology, 2) I am willing to try new technology only after it has been tested and proven, 3) I would rather wait until I need to use new technology, 4) I wait until I am required to use new technology and 5) I do not want to use new technology at all.*

(3) The Ten Item Personality Measure (TIPI) used was a short 10-item measure of the Big Five Dimensions (or Five-Factor Model) with a 7 point Likert scale. It was developed by Gosling, Rentfrow, and Swann (2003). This brief measure was chosen over longer versions because of time constraints experienced by busy teachers and school personnel, and because of its non-threatening nature. Though judged to be 'somewhat inferior to standard multi-item instruments', the instrument reached adequate levels in terms of (a) convergence with widely used Big Five measures in self, observer, and peer reports, (b) test-retest reliability, (c) patterns of predicted external correlates, and (d) convergence between self and observer ratings' (Gosling et al., 2003).

2.3 Procedure

Pilot Study

A pilot study was conducted some weeks prior to data collection to investigate time factors involved, questionnaire usability and ease of delivery. Nine participants completed the three questionnaires. These included three Transition Year students, three teachers and three parents. Completion time was noted and participant feedback was invited. It was noted that the term *cell phone* in the PTSI questionnaire might not be understood, the term was therefore changed to *mobile/s*. Questionnaire presentation was made more dyslexia friendly by enlarging font size and increasing spacing.

Challenges involved in processing large quantities of paper were also noted. Adult participants required 2 consent forms, one for themselves and one for parental consent regarding their child's participation, and 3 separate questionnaires. To reduce paper and confusion, the 3 questionnaires were printed on double-sided paper and stapled together. Colour coding for forms was also introduced.

Gaining School Approval

A staged approach to this quantitative and paper based research took place. Approval from the Department of Learning Sciences Ethics Committee (DLSEC) and the National Educational Psychological Services (NEPS) was obtained initially. Liaison with the NEPS East Coast Area Regional Director and the educational psychologists serving the 84 post primary schools in the region then took occurred.

Twelve schools were identified on the basis of their likely interest in the research project and their demographic profile. Exploratory phone calls to the Principals in these selected schools were conducted. Letters were then sent explaining the proposed research, seeking approval from each school's Board of Management (Appendix H). The letters stated that the research would be supervised by IADT, with NEPS approval. Benefits were stressed. For example, it was envisaged that questionnaires would be administered in students' class time, as part of their social studies curriculum. Four schools were chosen finally on the basis of their active interest and mutually suitable schedules.

Logistics

After school support was obtained, separate meetings took place with key staff, such as Transition Year Coordinators, to organize logistics. Dates, times and school rooms were identified. Procedures for sending explanatory letters and parental consent forms were agreed. In each of the 4 schools the Transition Year Head took responsibility for processing the return of parental consent forms, matching these with student numbers and making alternative arrangements for students without parental consent or who themselves did not wish to participate. The researcher was advised by Transition Year Coordinators as to parental or staff concerns, such as literacy difficulties. To encourage maximum participation from those with little or no internet access, hard copy was used rather than online questionnaires.

The following procedures were carried out in administering the student questionnaires. They were completed in double class periods (80 minutes), as advised by the Transition Year Head. As far as was practicable, the same instructions and explanations were given to students in each of the four schools before starting to complete the questionnaires. The research project rationale was outlined to students. Student consent forms were collected, their rights were repeated and questions answered. Students were then asked to read over the questionnaire pack quietly and note any issues arising. In each school student questions arose in seeking explanations of "*time saving devices*" and "*technological devices*" mentioned in the PTSI (e.g. Q.9, Q.26). This was answered consistently by using the example of a microwave cooker. Students also asked how they would answer PTSI questions relating to the workplace (e.g. Q.40 *Technology makes my job more complex).* A standard answer given was "*replace 'work' or 'job' with 'my life in general'.*

It was necessary to clarify certain words used in the TIPI, such as *Extraverted, Complex, Emotionally stable.* The following explanations were given, respectively. Extroversion was explained as *'outgoing, the sort of person who likes talking to new people',* complex was described as *'the sort of person who likes to go out of their way to understand something new' and* emotionally stable as *'someone who doesn't get upset by things easily'.*

All questions were then read out by the administrator and repeated if necessary. A general discussion was then facilitated about new technologies and personality differences. Special Needs Teachers or Special Needs Assistants (SNAs) attended the sessions in two schools to assist inclusiveness. The Demographic Survey was completed first, followed by the TIPI and finally the Personal Technostress Inventory. The average time for questionnaire completion in schools was 34 minutes. All research sessions lasted for 80 minutes.

Teacher participants also completed research consent forms. Research information was disseminated though staff meetings and questionnaires completed in staff free time. In one school the Transition Year Coordinator collected completed questionnaires; collection points were set up in the other three schools.

2.4 Ethics

Adherence to strict ethical guidelines and practice, both British Psychological Society and Psychological Society of Ireland, were maintained throughout the research in the four schools, with both students and adults. Ethical approval was obtained from the Ethics Committees of the Institute for Art, Design and Technology and from the National Educational Psychological Services. At each stage informed written consent was obtained after clear indications that all participants' rights, including those relating to non-participation and withdrawal of information, had been understood. Participants were informed that their data would be treated confidentially, they would not be identifiable in published research and that they had the right not to answer any questions. No deception took place, the purpose of the research was explained fully to all relevant parties beforehand and debriefing took place in all cases. As the research population included children less than 18 years of age, written parental consent for each child was obtained.

A complaints procedure was outlined, and documentation distributed giving relevant school, IADT and NEPS personnel contact details.

Staff involvement and active support was deemed crucial. Liaison with Guidance Counsellors, a Home-School Community Liaison Officer and 4th Year Heads took place to identify potential difficulties or sensitivities. These key staff were best placed to report any distress to pupils, or issues arising from the research. Adequate debriefing was given in all cases. No ill effects were observed or reported.

The copious amount of paper emanating from 277 questionnaires, consent forms from parents in respect of their children, from teachers and from students was coded by colour, numbered and has been stored securely. No personal identification was recorded other than consent forms.

3 Results

Quantitative research data, obtained from the Personal Technostress Inventory, the Ten-Item Personality Inventory and the Demographic Survey, was analysed using SPSS software. In the report tables, the asterisk symbol denotes statistical significance at 5% level.

3.1 Descriptive statistical analysis

3.1.1 Demographic Data

The research involved 277 participants, 78 males (28.16%) and 199 (71.84%) females. There were 113 adults involved, of whom 72 were female and 41 were male. Seventy seven percent of adult participants were aged between 26 and 50. Of the adults, 64 were teachers and 25 were parents: twenty four adults were both parents and teachers.

Of the 164 Transition Year students, 22.6% were male and 77.4% female. All students were in the 13 to 17 age category, except one who was in the 18 to 25 category.

While extensive demographic data was collected, its use was not deemed relevant to the study.

Table 1
Age and Number of Respondents

Age	n	%
13 - 17	164	59.2
18 - 25	15	5.4
26 - 35	35	12.6
36 - 50	52	18.8
51 - 64	11	4.0

3.1.2 Technostress and TIPI Descriptive Data

Table 2 indicates the mean and standard deviation scores from the Personal Technostress Inventory (PSTI) results.

Table 2
Mean & Standard Deviation Scores on PTSI

	n	Mean	Standard deviation
Total technostress	274	2.73	0.37
Learning technostress	274	2.76	0.92
Boundary technostress	271	2.84	0.58
Communication technostress	274	2.20	0.56
Time technostress	267	2.99	0.49
Family technostress	275	3.50	0.64
Workplace technostress	267	2.51	0.62
Societal technostress	271	2.60	0.61

When responding to Feelings about Technology questions 62.6% of the population showed themselves to be 'eager to try new technology' or 'willing to try it after it had been tested and proven'. Only 1.9% did not want to use new technology at all. In the Demographic question where participants were asked to rate themselves on their personal knowledge of computers, 1.4% described themselves as complete beginners.

Table 3
Feelings about Technology

Your feelings about new technology	n	%
I am eager and one of the first to try new technology	58	21.6
I am willing to try new technology only after it has been tested and proven	110	41.0
I would rather wait until I need to use new technology	79	29.5
I wait until I am required to use new technology	16	6.0
I do not want to use new technology at all	5	1.9

Mean scores and S.D. for the TIPI were not considered fully appropriate as they could only be computed from 10 sets of dyadic statements. . Therefore, the Table 4 statistics presented include median mode and 1st and 3rd quartiles. The middle 50% of respondents scored between 4 and 6 on Extraversion, Agreeableness, Conscientiousness and Emotional Stability. On Openness, the middle 50% of respondents scored between 4 and 6.5.

Kolmogorov-Smirnov tests were run to check normality of the data. Where data was found to be distributed normally, t-tests were used to examine differences between two groups of data. Total Technostress, Learning Technostress, Boundary Technostress, Time Technostress, and Workplace Technostress were normally distributed. All other variables were not normally distributed. In cases where data was not distributed normally Mann-Whitney U tests were used to examine differences between two groups of data. See Appendix K, Table 12, for results of Kolmogorov-Smirnov tests.

Table 4
Ten Item Personality Inventory (TIPI) Descriptives

TIPI Factors	n	Mean	s.d.	Median	Mode	Percentiles	
						25	75
Extraversion	277	4.98	1.33	5.0	6.0	4.0	6.0
Agreeableness	275	4.90	1.13	5.0	4.5	4.0	6.0
Conscientiousness	277	5.08	1.36	5.0	6.0	4.0	6.0
Emotional stability	274	4.82	1.33	5.0	6.0	4.0	6.0
Openness	275	5.38	1.10	5.5	5.5	4.5	6.0

3.2 t-tests

Using a 5% level of significance, Total Technostress was tested with a one sided t-test. The subscale scores were tested using a two sided t-test.

Technostress, and Workplace Technostress were found to be normally distributed

Table 5 - (Independent t-tests)
Students versus Adults on Total Technostress and Learning, Boundary, Time and Workplace Technostress subscales

	Student			Adult					
	n	mean	sd	n	mean	sd	t	df	pvalue
Total technostress	160	2.66	0.35	113	2.82	0.37	-3.81	271	<0.001*
Learning technostress	160	2.61	0.89	113	2.96	0.94	-3.05	271	0.003*
Boundary technostress	158	2.97	0.56	112	2.65	0.56	4.61	268	<0.001*
Time technostress	155	3.03	0.52	111	2.92	0.43	1.80	264	0.072
Workplace technostress	155	2.33	0.57	111	2.76	0.60	-5.92	264	<0.001*

Table 5 above shows that Total Technostress was found to be significantly higher for adults (*mean=2.82; s.d.=0.37*) than students (*mean=2.66; s.d.=0.35*) (*t=-3.81; df=271; p<0.001 one-tailed*).

Learning Technostress scores were also significantly higher for adults (*mean=2.96; s.d.=0.94*) than for students (*mean=2.61; s.d.=0.89*) (*t=-3.05; df=271; p=0.003 two-tailed*).

Workplace Technostress scores showed statistical significance and were higher for adults (*mean=2.76; s.d.=0.60*) than for students (*mean=2.33; s.d.=0.57*) (*t=-5.92; df=264; p<0.001 two-tailed*).

Boundary Technostress scores were significantly lower for adults (*mean=2.65; s.d.=0.56*) than for students (*mean=2.97; sd=0.56*) (*t=4.61; df=264; p=0.072 two-tailed*). Time Technostress was lower for adults (*mean=2.92; s.d.=0.43*) than students (*mean=3.03; s.d.=0.52*) but there was no statistical difference.

3.2.1 Gender

The population was divided on gender and t-tests were performed for adults versus students again.

Table 6a
Male Students versus Adult Males on Total Technostress and Learning, Boundary, Time and Workplace Technostress Subscales

	Student			Adult					
	n	mean	sd	n	mean	sd	t	df	pvalue
Total technostress	37	2.58	0.33	41	2.75	0.35	-2.21	76	.015*
Learning technostress	37	2.14	0.81	41	2.55	0.85	-2.22	76	.029*
Boundary technostress	36	2.94	0.45	41	2.61	0.60	2.69	73.12	.008*
Time technostress	36	2.90	0.49	40	2.91	0.51	-.09	74	.930
Workplace technostress	35	2.31	0.59	40	2.65	0.60	-2.52	73	.014*

Table 6a shows that Total Technostress was significantly higher for adult males (*mean=2.75; s.d.=0.35*) than for student males (*mean=2.58; s.d.=0.33*) (*t=-2.21; df=76; p=0.015 one-tailed*). Learning Technostress was significantly higher for adult males (*mean=2.55; s.d.=0.85*) than for student males (*mean=2.14; s.d.=0.81*) (*t=-2.22; df=76; p=0.029 two-tailed*). Boundary Technostress was significantly higher for student males (*mean=2.94; s.d.=0.45*) than for adult males (*mean=2.61; s.d.=0.60*) (*t=2.69; df=73.12; p=0.008 two-tailed*). Workplace Technostress was found to be significantly higher for adult males (*mean=2.65; s.d.=0.60*) than for student males (*mean=2.31; s.d.=0.59*) (*t=-2.52; df=73; p=0.014 two-tailed*).

Table 6b
Female Students versus Adult Females on Total Technostress and Learning, Boundary, Time and Workplace Technostress Subscales

	Student			Adult			t	df	pvalue
	n	mean	sd	n	mean	sd			
Total technostress	123	2.68	.35	72	2.86	.37	-3.45	193	<001*
Learning technostress	123	2.76	.87	72	3.18	.91	-3.24	193	0.001*
Boundary technostress	122	2.98	.59	71	2.67	.53	3.57	191	<0.001*
Time technostress	119	3.08	.53	71	2.93	.39	2.12	179.59	0.036*
Workplace technostress	120	2.34	.56	71	2.82	.60	-5.57	189	<0.001*

Table 6b shows that Total Technostress was significantly higher for adult females (*mean=2.86; s.d.=0.37*) than for student females (*mean=2.68; s.d.=0.35*) (*t=-3.45; df=193; p<0.001 one-tailed*). Learning Technostress was significantly higher for adult females (*mean=3.18; s.d.=0.91*) than for student females (*mean=2.76; s.d.=0.87) (t=-3.24; df=193; p=0.001 two-tailed)*. In addition, Workplace Technostress was significantly higher for adult females (mean=2.82; s.d.=0.60) than for student females (*mean=2.34; s.d.=0.56*) (*t=-5.57; df=189; p<0.001 two-tailed*).

On the other hand, Boundary Technostress was found to be significantly higher for student females (*mean=2.98; s.d.=0.59*) than for adult females (*mean=2.67; s.d.=0.53*) (*t=3.57; df=191; p<0.001 two-tailed*). Time Technostress was also significantly higher for student females (*mean=3.08; s.d.=0.53*) than for adult females (*mean=2.93; s.d.=0.39*) (*t=2.12; df=179.59; p=0.036 two-tailed*).

Table 7 - (Independent t-tests)
All Males versus All Females on Total Technostress and Learning, Boundary, Time and Workplace Technostress Subscales

	Males			Females					
	n	mean	sd	n	mean	sd	t	df	pvalue
Total technostress	78	2.67	0.35	196	2.74	0.37	-1.54	272	0.124
Learning technostress	78	2.36	0.85	196	2.92	0.90	-4.71	272	<0.001*
Boundary technostress	77	2.76	0.56	194	2.86	.58	-1.29	269	0.199
Time technostress	76	2.90	.50	191	3.02	.48	-1.80	265	0.072
Workplace technostress	75	2.49	.61	192	2.52	.62	-0.35	265	0.73

Learning Technostress scores were significantly lower for males (*mean=2.36; s.d.=0.85*) than for females (*mean=2.92; s.d.=0.90) (t=-4.71; df=272; p<0.001 two-tailed*).

3.2.2 Levels of Technostress Factors among Older and Younger Teachers: Digital Divide

t-tests were performed for younger (35 years or under) versus older teachers (36 years or over) to see if levels of Total, Learning, Boundary, Time, or Workplace Technostress varied with age. No statistically significant results were obtained. See Appendix K for SPSS Data Output. The same test was repeated just for male teachers, and just for female teachers.

For male teachers Learning Technostress was significantly higher for those aged 36 years or over (*mean=2.84; s.d.=0.68*) than for those aged 35 or under (*mean=2.11; s.d.=0.63*) (*t=-3.16; df=30; p=0.004 two-tailed*). No other statistically significant results were obtained.

Table 8
Technostress Levels Older and Younger Teachers

Male teacher	Aged 35 or under			Aged 36 or over			t	df	pvalue
	n	mean	sd	n	mean	sd			
Learning technostress	14	2.11	0.63	18	2.84	0.68	-3.16	30	0.004*

Table 9
Mann-Whitney U tests for Students versus Adults

	Student			Adult			Mann-Whitney U	Z	pvalue (2-tailed)
	n	Mean rank	Sum of ranks	n	Mean rank	Sum of ranks			
Communication technostress	161	143.95	23175.5	112	127.01	14225.5	7897.5	-1.75	0.08
Family technostress	161	122.07	19653.5	113	159.48	18021.5	6612.5	-3.87	<0.001*
Societal technostress	157	105.95	16633.5	113	176.56	19951.5	4230.5	-7.35	<0.001*
Your feelings about technology	160	115.59	18494	107	161.53	17284	5614	-5.03	<0.001*
Best describe your technology knowledge	163	116.33	18961	113	170.49	19265	5595	-5.89	<0.001*

- where pvalue (2 tailed) less than 0.05 test is statistically significant

Table 9 above illustrates that the distribution of students (*mean rank=122.07*) and adults (*mean rank=159.48*) differed significantly for Family Technostress (*Mann-Whitney U = 6612.5, n_{adults}=113; $n_{students}$=161; Z=-3.87; p <0.001 two-tailed*).
The distribution of students (*mean rank=105.95*) and adults (*mean rank=176.56*) differed significantly for societal technostress (*Mann-Whitney U = 4230.5, n_{adults} =113; $n_{students}$ =157; Z=-7.35; p <0.001 two-tailed*).

The distribution of students (*mean rank=115.59*) and adults (*mean rank=161.53*) differed significantly for 'your feelings about technology' (*Mann-Whitney U = 5614, n_{adults} =107; $n_{students}$ =160; Z=-5.03; p <0.001 two-tailed*).

The distribution of students (*mean rank=116.63*) and adults (*mean rank=170.49*) differed significantly for 'best describe your technology knowledge' (*Mann-Whitney U = 5595, n_{adults} =113; $n_{students}$ =163; Z=-5.89; p <0.001 two-tailed*).
In all cases the mean rank of adults was higher than for students.

3.3 Correlations

Table 10a
Correlation Total Technostress, Technostress factors and Technology questions with Emotional Stability

	Emotional stability		
	n	Correlation coefficient	pvalue (1-tailed)
Total technostress	272	-0.168	0.003*
Learning technostress	272	-0.195	0.001*
Boundary technostress	269	0.018	0.382
Communication technostress	272	-.152	0.006*
Time technostress	265	-.173	0.002*
Family technostress	272	-.022	0.356
Workplace technostress	265	-.131	0.017*
Societal technostress	269	-.021	0.365
Your feelings about technology	266	-.039	0.362
Best describe your technology knowledge	274	-.120	0.024*

* where pvalue (1 tailed) less than 0.05 test is statistically significant

Where results are statistically significant and correlation is greater than 0 positive correlation is present, where results are statistically significant and correlation is less than 0 then negative correlation is present.

Tavle 10a shows the correlations between Emotional Stability with Total Technostress, its 7 subscales and people's self rated feelings towards and knowledge of technology as follows-

Total Technostress (*Spearman'rho=-0.168; df= 270, p=0.003*),

Learning Technostress (*Spearman'rho=-0.195; df= 270, p=0.001*),

Communication Technostress (*Spearman'rho=-0.152; df= 270, p=0.006*),

Time Technostress (*Spearman'rho=-0.173; df= 263, p=0.002*),

Workplace Technostress (*Spearman'rho=-0.131; df= 263, p=0.017*),

and 'best describe your technology knowledge' (*Spearman'rho=-0.120; df= 272, p=0.024*). All showed statistically significant negative correlation with Emotional Stability.

Table 10b
Correlation of Total Technostress, Technostress factors and Technology questions with Openness to Experiences

	Openness to experiences		
	n	Correlation coefficient	pvalue (1-tailed)
Total technostress	273	-0.093	0.063
Learning technostress	272	-0.341	<0.001*
Boundary technostress	270	0.039	0.263
Communication technostress	273	-0.007	0.457
Time technostress	266	0.043	0.244
Family technostress	273	0.032	0.297
Workplace technostress	266	-0.059	0.171
Societal technostress	270	-0.014	0.407
Your feelings about technology	266	-0.170	0.003*
Best describe your technology knowledge	275	-0.210	<0.001*

* where pvalue (1 tailed) less than 0.05 test is statistically significant

Where results are statistically significant and correlation is greater than 0 positive correlation is present, where results are statistically significant and correlation is less than 0 then negative correlation is present.

Table 10b above shows the correlations between Openness and Total Technostress, its subscales and participants' feelings about and knowledge of technology. Learning Technostress (*Spearman'rho=-0.341; df= 270, p<0.001*), 'your feelings about technology' (*Spearman'rho=-0.170; df= 264, p=0.006*), and 'best describe your technology knowledge' (*Spearman'rho=-0.210; df= 273, p<0.001*) all showed significant negative correlation with Openness to Experience. That is high scoring values of Learning Technostress, 'your feelings about technology', and 'best describe your technology knowledge' were associated with low scoring levels of Openness to Experience.

Table 11, Appendix K - SPSS Data Output contains the multiple comparisons using ANOVA and Tukey HSD for individual comparisons. They illustrate the results of comparing Total Technostress, Learning Technostress, Boundary Technostress, Time Technostress, and Workplace Technostress, across 4 school types: Community college, Fee paying, VEC and comprehensive. No statistically significant differences were obtained.

4 Discussion

4.1 Background Context

This real world research set out to explore two main areas. One area related to whether young people, digital natives, experienced more technostress than older people, digital immigrants. Technostress is associated with discomfort in dealing with new technologies. Educational contexts were chosen as schools provide a key junction, or intersection, where young people have significant daily interactions with adults, primarily teachers. Schools were also deemed to be highly relevant because of the considerable impact of new technologies on learning and education.

The second exploratory area was into individual differences and whether personality factors impacted on levels of technostress amongst students and adults, primarily teachers.

4.2 Key Findings

4.2.1 Total Technostress higher for all Adults than Students

Hypothesis 1 was supported; it was found that participating adults, both male and female, reported higher levels of Total Technostress than male and female students, thus supporting the concept of a divide between digital natives and digital immigrants.

4.2.2 Correlation between Technostress levels and Emotional Stability

Research findings supported Hypothesis 2. A negative correlation between levels of Technostress, and Emotional Stability in the Big Five Personality Traits, was found.

4.2.3 No Correlation between Technostress and Openness to Experience

Hypothesis 3 was not supported; there was no significant correlation between Total Technostress and Openness to Experience scores. However, negative correlations were found between Openness to Experience and other Technostress subfactors.

4.3 Implications and Discussion of Findings

4.3.1 Technostress and Digital Natives and Immigrants

The research supported other research findings into young people's greater ease with new technologies compared with older people or digital immigrants (Palfrey & Gasser, 2008, Prensky, 2001a) in post industrial societies. Digital natives were born after the 1990s into networked worlds of networked social technologies where their digital learning was scaffolded by their peers, both online and in the real world. They "spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age" (Prensky, 2001a, p. 1).For digital immigrants, technological learning was mainly obtained through the workplace, through manuals and by trial and error. Study findings indicated that Total Technostress scores were consistently higher amongst adults than students. Nor was any significant difference found between younger adults, those of 35 years and younger, and those who were in the categories aged 36 and upwards. It is not therefore surprising that the students in the study experienced less technostress than the adults. However, it has been argued that competency with email, instant messaging, word processing and browsing the Internet does not necessarily equate to all technological applications or preferences for increased use of technology in the classroom (Kennedy, Judd, Churchward, & Gray, 2008).

4.3.2 Technostress Subscales

As mentioned, the Personal Technostress Inventory (PTSI) contained subscales, in addition to a Total Technostress score. These subscales consisted of Learning, Boundary, Communication, Time, Family, Workplace and Societal Technostress. After analysis of these subscales, further interesting findings were obtained.

4.3.3 Learning Technostress

In line with research findings on Total Technostress and digital immigrants, results for the subscale Learning Technostress was found to be higher for adults than for students. Older male and female adults (36 years and upwards) reported more Learning Technostress than younger male and female (35 years and under) adults. A

possible explanation is that younger adults in the 26 and 35 age cohort may have been teenagers when internet technologies were being rolled out and available to them.

However, gender differences impacted in this subscale. When all males (adults and students) and all females were compared, the male cohort reported less Learning Technostress than the female cohort. This area is worthy of further exploration.

Weil and Rosen (1997) contend that learning to use technology by beginners is made intimidating by poor design, unclear instructions and ungrammatical and jargonistic manuals. They blame instructors for ignoring individual learning styles and not matching their presentations or explanations to individual levels of competency, learning styles and attention spans. According to Weil and Rosen (1997), instructors are often 'early adopters' who enthusiastically assume control of presenting problems, or give too rapid explanations.

Weil and Rosen (1997) suggest that optimal learning takes place when individual learning styles and modalities, environmental elements and individual emotional elements such as motivation, persistence, appropriate learning structures and social elements are taken into account. This stance is applicable to all learning situations for both adults and younger people.

4.3.4 Workplace, Boundary and Time Technostress

Not surprisingly as students are, for the most part, not part of the workplace, Workplace Technostress was found to be higher for all adults than students and for all male and female adults than for all male and female students, respectively.

All adults indicated lower levels of Boundary Technostress than students, both male and female. Gender differences impacted on Time Technostress. Female students reported more technostress on this Time subscale than did adult females.

4.3.5 Emotional Stability versus Total Technostress and Technostress Subscales

A negative correlation was found between the Big Five traits of Emotional Stability and Total Technostress. A negative correlation was also found between Emotional Stability and Learning Technostress, Communication Technostress, Time and Workplace Technostress. In addition, there was a statistically significant correlation between Emotional Stability and reported Technical Knowledge. Not surprisingly, emotionally stable people cope better with stress than their counterparts.

In all these cases, higher scores on Emotional Stability were associated with lower scores on the Technostress subscales mentioned above. Conversely, lower scores on Emotional Stability were associated with higher scores on these subscales.

4.3.6 Openness to Experience and Technostress Learning Subscales, Technical Feelings & Knowledge

Negative correlations were found between the Big 5 Openness to Experience subscale and the Technostress subscale of Learning, and with participants' reported feelings towards, and knowledge of, technology. Although the correlation between Total Technostress and Emotional Stability did not quite meet statistical significance, it was of borderline significance (spearman's rho = -0.093; df = 271, p= 0.063). Further study with a larger sample size may reach significance levels.

4.4 Theoretical Implications

This study's indications that technostress is a factor for adults, in their working lives, is supported by Hargittai (2002) and others. New work demands, multi-tasking and information overload, associated with ICT, contribute to technostress and feeling of lack of control (Aida, Azlina and Balqis, 2007). While Bakar and Mohamed (2008) contend that Malaysian teachers of vocational related subjects are more confident of using ICT in teaching, they found that teachers still experience technostress, albeit moderately. Yet Prensky (2008) stresses the need for a new pedagogical paradigm where teachers reframe teaching 'the basics', merely as a backup, in case new technologies fail. This involves focusing on the medium and the message, rather than the traditional 3 R methodologies. Children, argues Prensky (2008), need to learn how to succeed and survive in the 21st century with new technological tools.

Already, there are large generational differences in internet use; young Irish males spent 9 hours a week online in 2008 (Amárach, 2008). People under 25 are twice as likely to use web based SMS as over 55 year olds. Two thirds of under the 25 cohort use instant messaging, while 91% of them access YouTube. New forms of communication have become the norm for young people. Privacy issues, associated with online personal information, affect all. What better place than school to inform young people about personal disclosure online and equip them with skills in critical analysis of web based material?

Challenges remain when upskilling teachers in ICT, even in Ireland where government policy aims towards an information society and knowledge economy. Traditional pedagogies are embedded deeply in Irish culture and educational curricula. The current financial climate also impacts. School ICT advisors, established in Education Centres, have been redeployed. Yet proximity to, and familiarity with, new technologies is crucial to Prensky's vision. In addition, teachers need appropriate ICT learning environments and instructors who demystify technology and present it in an accessible non threatening way. Green (2006) warns against over eager instructors who fail to realise the steep learning curves, who inhibit learning by using jargonistic language or by 'taking over' presenting technological problems.

The relationship between individual personality characteristics and negative feelings towards technology has also been examined in this study. People with high levels of Emotional Stability reported low levels of technostress and vice versa. Association of low neuroticism and low technostress was also found by Anthony, Clarke and Anderson (2000), Heinström (2003) and Korukonda (2007). It seems reasonable to assume that promoting self efficacy and personal coping mechanisms helps to reduce psychological stress, associated with internet technology.

While no relationship was found between Openness and technostress, other research by Anthony, Clarke and Anderson (2000), Korukonda (2007) and Nov and Ye (2008) suggest that Openness assists in seeking out new knowledge, in critical thinking and in dealing with change.

The assumption that there are personality factors, that affect people's outlook and technological acceptance, need not be seen as a purely deterministic one. Context and motivation also contribute to people's behaviour.

4.5 Limitations of Study

Vocabulary in Measures, Assistance of Others in Questionnaire Completion

The Ten Point Personality Inventory (TIPI), with its 7 point Likert scale, appeared to have drawbacks for some student participants. While the Inventory had been printed in a dyslexia friendly format, and its contents read out to the student class groups, confusion arose from the *agree/disagree* format. "Where should I tick Miss if I'm not anxious?" was one question asked. It should be noted that for most students the TIPI/PTSI questionnaires were the first of that kind they had completed. Secondly, apart from small numbers of pupils excluded from the sessions because of lack of parental consent, whole Transition classes were involved. It was expected that there would be a normal distribution of cognitive abilities, fine motor skills attributes and specific learning difficulties within each student population. This seemed to be the case as some students raced ahead of their peers completing the questionnaires speedily. Others, even with help from Special Needs Assistants or from the questionnaire administrator, took much longer.

Difficulties also arose in defining certain words used in the TIPI, such as *Extraverted, Complex, Emotionally stable.* The phrasing of some TIPI items, particularly item (2) *I see myself as ..... Critical, quarrelsome* and item (10) *I see myself as ....Conventional, uncreative* was thought to give somewhat skewed responses, given their implication of undesirable traits. Given that some pupils received assistance in form completion, the presence of another/others may have impacted on their self ratings.

Similar issues, relating to vocabulary and its explanation, arose in the Personal Technostress Inventory (PTSI). Questions were asked as to what *"new technology", "time saving devices" and "technological devices"* meant.

4.5.1 Need for Updating PTSI

The Personal Technostress Inventory (PTSI), developed in 1998 and 1999, appears somewhat out of date. Since its inception, various technological devices and software applications, such as Ipods, PDAs, mobile phones that are text, photo and video enabled, social networking sites and computer games, have become ubiquitous, particularly amongst young people. Questions relating to cyberbullying, an additional stressor, would also be pertinent here. Furthermore the PTSI appears more suited to adult populations, rather than young people, with questions relating to the workplace. Adaptation of the PTSI to include new technologies, applications and responsiveness to different age populations might make the measure more appropriate and relevant.

4.7 Suggestions for Further Research

Qualitative research into students and teachers/adult attitudes towards technostressors and towards time spent on online applications would add useful insights into how new technologies impact on different generations.

The issue of gender was apparent in the PTSI subscales of Learning and Time Technostress. Although it has not been addressed adequately in this dissertation, it would bear further investigation.

Socio-economic demographics in relation to technostress are other areas that could be investigated. Privacy concerns prevented their exploration here.

Reinvestigation of technostress might produce different results in 15 years time. Moore (2007) predicted that technological change limits would then be reached. Technostress may prove also to be relatively transient as pervasive computing technologies become easier to use. People may not need the same level of technical skill and knowledge to participate in a smart world and engage in civic society. However, global inequalities may prevent this utopian vision becoming a reality.

4.8 Conclusions

Findings from this study have indicated that technostress contributes to a digital divide between adults and young people in Irish schools. With the perspective of increasing technological change in the short to medium term future, this has implications for what is taught in schools and for how teachers' roles may change from facilitating to mediating knowledge acquisition. Findings on personality differences, and their relationship with technostress, bring into question how learning environments can be most effective in meeting the individual needs. However, the wider picture of social, educational and economic realities cannot be ignored.

"No man is an Island, entire of itself"
John Donne (1572 - 1631), Meditation XVII.

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Appendix A - Demographic Survey

Please tick the items that apply to you.

1. Are you?

Male	
Female	

2. Are you?

School Student	
School Teacher	
Parent	
School Teacher & Parent	

3. Please tick your age-group.

Age Group	
13 – 17 years	
18 – 25 years	
26 – 35 years	
36 – 50 years	
51 – 64 years	
65 +	

4. What level of education have you achieved to date? Please tick highest level of achievement (in white areas).

Primary School		
Junior Cert/Intermediate Certificate		
Leaving Certificate		
Other Second Level		
Third Level (tick highest below right)		
	Certificate	
	Diploma	
	Degree	
	Post-graduate	

5. How many televisions do you have at home? [more space before boxes?]

None	
1	
2	
3	
4	
More than 4	

6. Please indicate the number of each technological device you use at home (or car) in the boxes provided. For example put 2 after mobiles, if you use two.
[more space. Make initial capitals in boxes consistent]

Mobile Phone		Digital Camera	
Personal Computer		Sat Nav in car	
DVD Player		Laptop	
Digital Radio		Blackberry/Hand held Computer	
iPod/digital Music Player		Games Console	
Digital Satellite Receiver		Home Cinema System	

7. Which statement below best describes your knowledge of technology?

Very good	
Good	
Fair	
Not very good	
A complete beginner	

8. Have you got access to Broadband at home?

Yes	
No	
Don't know	

Thank you for completing this form. Your information will be anonymous.

Appendix B – Ten Item Inventory (TIPI)

Here are some personality traits that may or may not apply to you. Please tick the box -that indicates the extent to which **you agree or disagree with that statement.** You should rate the extent to which each pair of traits applies to you, even if one characteristic applies more strongly than the other.

For example, a person who thinks they are outgoing with people, and enthusiastic about life and things in general, might tick 7 as below.

	I see myself as	1.Disagree strongly	2.Disagree moderately	3.Disagree a little	4.Neither agree nor disagree	5.Agree a little	6.Agree moderately	7.Agree strongly
1	Extraverted, enthusiastic							√

Please complete the 10 questions below, according to how you see yourself. Remember, all answers will be anonymous.

	I see myself as	**1.Disagree strongly**	**2.Disagree moderately**	**3.Disagree a little**	**4.Neither agree nor disagree**	**5.Agree a little**	**6.Agree moderately**	**7.Agree strongly**
1	**Extraverted, enthusiastic**							
2	**Critical, quarrelsome**							
3	**Dependable, self-disciplined**							
4	**Anxious, easily upset**							
5	**Open to new experiences, complex**							
6	**Reserved, quiet**							
7	**Sympathetic, warm**							
8	**Disorganised, careless**							
9	**Calm, emotionally stable**							
10	**Conventional, uncreative**							

Appendix C - Personal Technostress Inventory

Personal Technostress Inventory

(PTSI)

PTSI DIRECTIONS:

"Technology" refers to the machines or systems that are supposed to make your life easier and save your work. This questionnaire is about technology that may cause people stress. For each statement, please rate how you feel by putting an "**X**" in the box that reflects your response.

	Personal Technostress Inventory Items	**Never**	**A Little**	**A Fair Amount**	**Often**	**Very Often**
1.	I am comfortable learning new technology.					
2.	Technology's beeps and buzzing sounds bother me.					
3.	I get distracted by communication technologies like telephones, fax machines, mobiles and pagers.					
4.	I have enough free time in my life.					
5.	Family members each spend time separately in their home using their own technologies.					
6.	I know how to deal with technological malfunctions or problems.					
7.	It seems that when a technological device needs repair, it is easier to discard and replace it rather than fix it.					
8.	I do not understand the "language" of technology (e.g., RAM, ROM, virus, gigabytes, etc.).					
9.	My timesaving devices save me time.					
10.	Having technology available at home leads me to work longer.					
11.	Solving a technological problem seems like an interesting challenge.					
12.	I set clear limits on the times and ways for people to contact me.					
13	I like to leave machine messages when I know I will not have to talk directly to the person.					
14.	I get things done in the time I have planned to complete them.					

	Personal Technostress Inventory Items	Never	A Little	A Fair Amount	Often	Very Often
15.	I feel that young people know more about technology than adults do.					
16.	Technology interferes with my personal creativity.					
17.	I worry about the accuracy of information on the Internet.					
18.	I find complex voice-mail systems irritating and time consuming.					
19.	I find myself doing more than one task at a time.					
20.	Using technology at home after work hours interferes with my free time.					
21.	I find most technology easy to learn.					
22.	I believe I am forgetting how to do things the "old fashioned" way (without using technology).					
23.	When I leave a message for someone, I worry when I'll hear back from the person.					
24.	I find myself interrupting what I am doing to attend to something else.					
25.	I believe areas of the Internet are not safe for children.					
26.	Timesaving devices end up requiring ***more*** time, rather than saving time.					
27.	The amount of information available about me through technology worries me.					
28.	I worry that some people are falling further behind because of their lack of knowledge about technology.					
29.	When I talk on the telephone I pay attention to the conversation and do not do anything else.					
30.	Technology changes so fast it is hard to keep up.					
31.	When technology has problems, I believe they are fixable.					
32.	I worry if I don't check my messages for a while.					

	Personal Technostress Inventory Items	Never	A Little	A Fair Amount	Often	Very Often
33.	I feel overloaded by all the messages I need to answer in a day.					
34.	It is difficult for me to concentrate on work because my mind wanders to other things I need to do.					
35.	I believe that young people overuse technology.					
36.	Technology invades people's privacy.					
37.	Technology isolates people.					
38.	I am comfortable with all the new technology that is showing up in my environment (e.g., grocery stores, petrol stations, banks, etc.).					
39.	I am an accurate time estimator.					
40.	Technology makes my work/studies more complex.					
41.	I feel I need to respond to messages as soon as possible.					
42.	I believe that most people know more about technology than I do.					
43.	I get frustrated figuring out the best way to reach someone.					
44.	I get impatient waiting for technological devices to finish their work.					
45.	I lose track of time when using certain types of technology.					
46.	I feel as up-to-date on technology as my peers.					
47.	I am concerned about the privacy of technological communications.					

Which one of the following statements best describes your feelings about technology? Please tick <u>one box only</u> below on the right.

1	I am eager, and one of the first, to try new technology.	
2	I am willing to try new technology only after it has been tested and proven.	
3	I would rather wait until I need to use new technology.	
4	I wait until I am required to use new technology.	
5	I do not want to use new technology at all.	

Appendix D – PTSI Reliability, Validity Assessment Results

Personal TechnoStress Inventory (PTSI)

Assessment of Reliability, Validity and Preliminary Results

Overview

The Personal TechnoStress Inventory (PTSI) was developed to establish a measure of Weil and Rosen's seven types of TechnoStress as seen in their book, *TechnoStress: Coping With Technology @Work @Home @Play (Wiley, 1997)*. These include:

- Learning TechnoStress
- Boundary TechnoStress
- Communication TechnoStress
- Time TechnoStress
- Family TechnoStress
- Workplace TechnoStress
- Societal TechnoStress

In all, four studies were completed to ascertain the reliability and validity of the PTSI as well as establish preliminary indications of demographic differences. In addition, a sample of students at a university in China was used to provide additional insights into the measurement tool.

Samples

Four samples of adults (n = 145, 177, 197, 289) were obtained at various times during 1999. The four samples were found to be similar in demographic composition. The following table displays the demographic information for the entire sample (n=808). Note: The Chinese sample is not included in this table.

DEMOGRAPHIC CHARACTERISTICS	PERCENTAGE OF SAMPLE
Gender:	
Male	47%
Female	53%
Age:	
18-25	39%
26-35	26%

36-50	22%
51-64	10%
65+	4%
Education:	
Not graduated high school	5%
High school graduate	17%
Technical school graduate	3%
Some college	46%
College degree	23%
Postgraduate degree	5%
Family Structure:	
Not married with no children	49%
Not married with children	16%
Married with no children	12%
Married with children	24%
Ethnic Background:	
Asian descent/Asian-American	10%
Black/African American	27%
Hispanic/Spanish descent	26%
White/Caucasian	34%
Other	4%

Measures

Each study collected its own measures. The one common measure was the PTSI. The PTSI includes 47 items taken from Weil and Rosen's book, *TechnoStress: Coping With Technology @Work @Home @Play (Wiley, 1997).* The questionnaire gave the following instruction:

The items in the questionnaire refer to issues about technology that may cause people stress. For each statement, please rate how you feel by placing a check in the box to the right.

Each statement was phrased in the positive or negative and answered on a Likert scale of Never, A Little, A Fair Amount, Often and Very Often. Overall, 14 of the 47 items were phrased in the positive direction and the rest in the negative.

Other measurment tools used in this validation study include:

1. A five-point scale assessing feeling about the prospect of using new technology.
2. A five-point scale assessing current attitude toward technology.
3. A five-point scale assessing current level of anxiety about technology.
4. A 30-item adjective checklist to describe how you might feel upon being given a "new computerized gadget that did lots of things."
5. A 4-item scale rating level of technophobia from none to high.
6. Four computer literacy subscales that assessed telecommunication use, application use, operating system skill and knowledge of computers and technology (Patrikas, 1999).
7. A 20-item measure of State Anxiety (one half of Speilberger's State-Trait Anxiety Inventory)
8. A 10-item measure of self-efficacy.

Reliability

The 47-item Personal TechnoStress Inventory has a Cronbach's alpha of .82, which indicates that it is internal consistent. The individual subscales included the following numbers of items:

- Learning TechnoStress (4 items)
- Boundary TechnoStress (6)
- Communication TechnoStress (6)
- Time TechnoStress (9)
- Family TechnoStress (4)
- Workplace TechnoStress (9)
- Societal TechnoStress (9)

Cronbach's alpha was computed for each with five subscales showing acceptable consistency (Learning: .73; Communication: .54; Time: .50; Workplace: .61 and Societal: .57) and two showing poor consistency (Boundary: .27 and Family: .31). Thus, it is recommended that the latter two subscales be used with caution as they may not show internal consistency.

Validity

The following table show the correlation and statistical significance level for the total TechnoStress score and each of the validity check items mentioned above. It is obvious from this table that the PTSI was indeed related to other measures of similar constructs.

VALIDATION MEASURMENT TOOL	CORRELATION WITH PTSI
Feeling about the prospect of using new technology	.32***
Current attitude toward technology	.43***
Current level of anxiety about technology	.45***
Adjective checklist - positive adjectives	-.28***
Adjective checklist - negative adjectives	.49***
Level of technophobia	.38***
Telecommunication use	-.29***
Application use	-.27***
Operating system skill	-.27***
Knowledge of computers and technology	-.44***
State Anxiety	.22**
Self-Efficacy	-.39***

Normative Data

The following table displays the normative data for the combined sample of 808 adults. NOTE that higher scores mean more TechnoStress and that the scale is 1=Never, 2=A Little, 3=A Fair Amount, 4=Often and 5=Very Often.

TOTAL PTSI SCORE AND SUBSCALES (Means)	USA SAMPLE (N=808)	RANK ORDER
TOTAL PTSI	2.89	
Learning TechnoStress	2.79	4th
Boundary TechnoStress	2.63	6th
Communication TechnoStress	2.32	7th
Time TechnoStress	2.98	2nd
Family TechnoStress	3.27	1st
Workplace TechnoStress	2.67	5th
Societal TechnoStress	2.81	3rd

As seen above, the mean PTSI score is around "3" or near the middle of the scale. Looking at the subscales, it appears the two subscales with the most TechnoStress are Time and Family. Recall that these are also the two with the least internal consistency, so any comparisons may be suspect. From there, Societal and Learning are next followed by Boundary and Workplace and then Communication showing the least TechnoStress.

Preliminary Results

Highlighted below are some of the preliminary conclusions that may be drawn from demographic comparisons. For purposes of brevity, only the average TechnoStress score will be used:

- Men and women did not differ on TechnoStress.
- Older and Younger people did not differ on TechnoStress.
- People with different educational levels did not differ on TechnoStress.
- People of different ethnic backgrounds did not differ on TechnoStress.
- People with different family compositions did not differ on TechnoStress.

Summary and Conclusions

This short report has confirmed the reliability and validity of a new measurement tool, the Personal TechnoStress Inventory. In addition, at least with the current sample of 808 adults, it is clear that TechnoStress is not subject to demographic differences. This is different from previous constructs like "technophobia" or "computer anxiety" which showed differences among many of the demographic characteristics. Thus, this confirms the PTSI as a bias-free measure of stress from technology.

Appendix E – Teacher Participant Consent Form

Research Project Participation

Technostress & Personality: Factors in the Digital Divide?

This research project forms part of the

Institute of Art, Design and Technology's MSc. in Cyberpsychology

I understand that

- My participation in the research is voluntary
- I have the right not to answer questions I do not wish to answer
- I have the right to personal anonymity and to confidentiality for any personal information disclosed.
- My name or any identifiable features will not be used in the research nor made available to any other party.
- I can withdraw from this consultative process at any stage and can have my comments, inputs or suggestions destroyed.
- There will be an opportunity to discuss the consultation process, after it has taken place.
- Information given willingly by me will be kept for less than 12 months, and then destroyed.
- Information given by me will not affect my child/children's schooling

I understand the purpose of this research.

I have received the researcher's contact details for further queries.

I have also been given contact details of his/her supervisor, should I have any complaints.

Signed _____

Date _____

Appendix F – Parents'/Guardians' Consent Form

For their children to be involved in the research below

Technostress & Personality: Factors in the Digital Divide?

I/We consent to the participation of our daughter/son in this research. I/We understand that my daughter/son's school has been informed that this research is being carried out

I also understand that

- My son/daughter's participation in the research is voluntary
- S/he has the right not to answer questions they do not wish to answer
- They have the right to personal anonymity and to confidentiality for any personal information disclosed.
- My son/daughter's name or any identifiable features will not be used in the research or made available to any other party.
- My son/daughter can withdraw from this consultative process at any stage and can have their comments, inputs or suggestions destroyed.
- My son/daughter will have an opportunity to discuss the research process thoroughly before and after it has taken place.
- Information given willingly by my child will be kept for less than 12 months, and then destroyed.
- Information given my child will not affect his/her schooling
- I/We can request the omission of my/our son/daughter's information, obtained by questionnaire, at any stage should I/we wish.

I understand the purpose of this research.
I have received the researcher's contact details for further queries.
I have also been given contact details of her supervisor, should I have any complaints.

Signed _____ (legal custodian of the student)

Date _____

Appendix G – Teacher Participant Consent Form

Research Project Participation

Technostress & Personality: Factors in the Digital Divide?

This research project forms part of the

Institute of Art, Design and Technology's MSc. in Cyberpyschology

I understand that

- My participation in the research is voluntary
- I have the right not to answer questions I do not wish to answer
- I have the right to personal anonymity and to confidentiality for any personal information disclosed.
- My name or any identifiable features will not be used in the research or made available to any other party.
- I can withdraw from this consultative process at any stage and can have my comments, inputs or suggestions destroyed.
- There will be an opportunity to discuss the consultation process, after it has taken place.
- Information given willingly by me will be kept for less than 12 months, and then destroyed.
- Information given by me will not be shared with school or other personnel.

I understand the purpose of this research.

I have received the researcher's contact details for further queries.

I have also been given contact details of her supervisor, should I have any complaints.

Signed _____

Date _____

Appendix H – Student Participant Consent Form

Research Project Participation

Technostress & Personality: Factors in the Digital Divide?

This research project forms part of the

Institute of Art, Design and Technology's MSc. in Cyberpyschology

I understand that

- My participation in the research is voluntary
- I have the right not to answer questions I do not wish to answer
- I have the right to personal anonymity and to confidentiality for any personal information disclosed.
- My name or any identifiable features will not be used in the research or made available to any other party.
- I can withdraw from this consultative process at any stage and can have my comments, inputs or suggestions destroyed.
- There will be an opportunity to discuss the consultation process, after it has taken place.
- Information given willingly by me will be kept for less than 12 months, and then destroyed.
- Information given by me will not be shared with school or other personnel.

I understand the purpose of this research.

I have received the researcher's contact details for further queries.

I have also been given contact details of her supervisor, should I have any complaints.

Signed _____

Date _____

Appendix I.a – Letter of Intention to Schools

HEADED NOTEPAPER
National Educational Psychological Service, Floor 3, Trident House, Blackrock, Co. Dublin

Recipients: **School Principal**
Chairperson Board of Management

Re: Participation in Research Project
Transition/4th Year students and their Parents, School Teachers

Dear _____,

Thank you for your initial interest in the research project, Technostress & Personality: Factors in the Digital Divide? As mentioned, I would appreciate greatly the support of the school and its Board of Management in carrying out this research.

The purpose of the research is to explore whether 'technostress' and personality traits impact on our increasingly computerised lives at school, at work and at home. The research will involve approximately 300 participants from schools in South County Dublin and Co. Wicklow. Questionnaires will be used with Transition, or 4th Year students, and with secondary school teachers.

Technostress, described as negative psychological reactions towards technology, will be surveyed using a 47 question inventory and compared amongst the participating groups. A short non-intrusive 10 question inventory on personality will also be used along with a brief demographic questionnaire. In the case of parents and teachers, all 3 questionnaires should be completed in 40 minutes or less. Regarding parents, I will liaise with you/the School Principal as to the most appropriate means of their participation.

In the case of students, it is envisioned that the questionnaires might be administered in class time as part of their social studies. As a former secondary school teacher, I am happy to explain the research rationale, oversee the class/es involved and facilitate a class discussion for a double period on the advantages and disadvantages of technology, particularly internet usage and abusage. However, I am equally happy to fit into the school schedule as advised.

I work as an educational psychologist with the National Educational Psychological Service (NEPS). I am also completing a MSc. in CyberPsychology. This involves studying the human mind and behaviour in the context of human-technology interaction.

As with all psychological research, ethical guidelines are paramount. Should the school wish to become involved, informed consent by all parties, including parents in respect of their children, will be necessary. I include copies of the research questionnaires and consent forms for your information. My academic supervisor, _____, will be available for any complaints or further queries. S/he may be contacted at his/her email address _____or through the Institute of Art, Design and Technology's (IADT). My NEPS supervisor _____may be contacted at _____.

While this research has the approval of NEPS, it is not compulsory for the school to participate. Involvement, or otherwise, will not affect NEPS' normal services to the school. I would be obliged if you would contact me should you require additional information. Details are below.

My thanks and best wishes,

Avril Burgess
Educational Psychologist, National Educational Psychological Services
Tel: 01 283 3028 Email: avril_burgess@neps.gov.ie

Appendix I.b – Letter of Intention to Parents

HEADED NOTEPAPER
National Educational Psychological Service, Floor 3, Trident House, Blackrock, Co. Dublin

Recipients: **Parents**

Re: Participation in Research Project
Transition/4th Year students and their Parents and School Teachers

Dear _____,

You may have heard that the school is considering taking part in a research project. It is about how people feel about computer technology and whether their feelings are affected by their personality. The research is called "Technostress & Personality: Factors in the Digital Divide?"
The 'digital divide' is a term used to describe the gap between people who can use computers well and those who do not.

Teachers in the school have agreed to take part in this research. I am writing to ask you whether you are prepared to let your son/daughter participate also?

If you agree for your son/daughter to participate, this is what will happen. I will give out 3 questionnaires in civics/social studies class to all students in 4th Year, or Transition Year. One questionnaire has 47 short questions about how people feel about technology. People tick the box that best describes how they feel. The 2nd questionnaire is very short. It has 10 questions about how people describe themselves. The 3rd questionnaire contains simple questions such as what age group you belong to, the type of education you received and 6 questions about your general attitude to technology.

Before starting the questionnaires, I will be discussing what the research is about with the class and making sure that everyone is comfortable. Afterwards we will be having a general discussion about computers and internet use. I will also have some brochures on internet safety to give to students.

If you want to go ahead, I have attached copies of the questionnaires and consent forms in respect of your son/daughter. I have also included their rights if you and your child decide to participate.

However, you have every right not to allow your son/daughter to participate either. It will not affect the school's attitude to you or your child in any way.

I work as an educational psychologist with the National Educational Psychological Service (NEPS) but used to be a secondary school teacher. This research has the approval of NEPS and I will be supervised by my college supervisor. My academic supervisor, _____, will be available for any complaints. S/he may be contacted at his/her email address _____or through the Institute of Art, Design and Technology (IADT). My NEPS supervisor _____may be contacted at _____I would be obliged if you would contact me should you require additional information. Details are below.

My thanks and best wishes,

Avril Burgess
Educational Psychologist, National Educational Psychological Services
Tel: 01 283 3028 Email: avril_burgess@neps.gov.ie

Appendix I.c – Thanks & Instructions to Parents

THANK YOU & INSTRUCTIONS

First of all, I am very grateful to you for reading and completing, should you wish to do so, information about this research.

The research involves 3 sets of people, students, parents and teachers. Overleaf is a 1 page summary of what the research is about. This gives my contact details if you have any queries.

Parents who wish their son/daughter to be involved in this research should sign the **Parent/Guardian Consent Form** and return it to the school.

No student can participate without having a consent form from their parent/s or guardians.

If you, as a parent, agree to participate in the research yourself, I would be obliged if you could complete the following forms.

1. Parent Participant Consent Form (separate from stapled pages).

The following 3 items are stapled together.

2. Demographic Survey
3. Ten Item Inventory (TIPI)
4. Personal Stress Inventory.

If you do not wish to be involved, please return the questionnaires to the school. They should not be completed by your son/daughter at home.

All information will be kept confidentially. Your questionnaire responses are anonymous and will not be associated with you in any way.

Many thanks again,

_____

Avril Burgess

Appendix J – Debriefing Form

If you have taken part in the Technostress survey, thank you again for your co-operation in this research which is very much appreciated. It is important that everyone who takes part is happy to have done so, and has no worries or concerns that have not been addressed.

This form gives you the opportunity to write down any questions you may have about your part in the research below. If you would prefer to discuss these face to face or over the phone, I can be contacted through the school or at the following email address - avril.burgess@gmail.com

Your comments

_____

_____

_____

Questions or concerns

_____

_____

You may also discuss any issue that has troubled you with _____

(person nominated by School Principal, probably Guidance Counsellor, Pastoral Care Team Member, Year Head, Home School Community Liaison Officer etc. in the case of students and parents).

S/he will contact me if you wish.

My thanks again for your time and interest.

Avril Burgess
CyberPsychology MSc. Student
National Educational Psychological Services

Appendix K - SPSS Data Output

Table 3
Feelings about Technology

Statistics

		Your feelings about technology	Best describe your technology knowledge	Extraversion total score from TIPI scale	Agreeable ness total score from TIPI scale	Conscientio usness total score from TIPI scale	Emotional Stability total score from TIPI scale	Openness to Experiences total score from TIPI scale
N	Valid	268	277	277	275	277	274	275
	Missing	9	0	0	2	0	3	2
Mean		2.25	2.07	4.9801	4.9018	5.0758	4.8212	5.3764
Median		2.00	2.00	5.0000	5.0000	5.0000	5.0000	5.5000
Mode		2	2	6.00	4.50	6.00	6.00	5.50
Std. Deviation		.926	.910	1.33126	1.13077	1.36056	1.33526	1.10043
Percentiles	25	2.00	1.00	4.0000	4.0000	4.0000	4.0000	4.5000
	50	2.00	2.00	5.0000	5.0000	5.0000	5.0000	5.5000
	75	3.00	3.00	6.0000	6.0000	6.0000	6.0000	6.0000

Table 5 - (Independent t-tests)
Students versus Adults on Total Technostress and Learning, Boundary, Time and Workplace Technostress sub Factors

Group Statistics

	group students or adults (excludes an	N	Mean	Std. Deviation	Std. Error Mean
total technostress	student	160	2.6569	.34971	.02765
	adult	113	2.8241	.36803	.03462
learning technostress	student	160	2.6141	.89454	.07072
	adult	113	2.9558	.93555	.08801
boundary technostress	student	158	2.9684	.55997	.04455
	adult	112	2.6503	.55704	.05264
time technostress	student	155	3.0344	.52339	.04204
	adult	111	2.9249	.43375	.04117
workplace technostress	student	155	2.3341	.56649	.04550
	adult	111	2.7608	.59858	.05681
communication technostress	student	161	2.2567	.59336	.04676
	adult	112	2.1235	.50112	.04735
family technostress	student	161	3.3820	.63742	.05024
	adult	113	3.6858	.59366	.05585
societal technostress	student	157	2.3588	.46343	.03699
	adult	113	2.9272	.63235	.05949

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total technostress	Equal variances assumed	.244	.621	-3.807	271	.000	-.16717	.04392	-.25363	-.08071
	Equal variances not assumed			-3.773	233.503	.000	-.16717	.04431	-.25446	-.07988
learning technostress	Equal variances assumed	.001	.980	-3.050	271	.003	-.34169	.11203	-.56225	-.12113
	Equal variances not assumed			-3.026	234.470	.003	-.34169	.11290	-.56412	-.11926
boundary technostress	Equal variances assumed	.080	.777	4.608	268	.000	.31806	.06902	.18217	.45395
	Equal variances not assumed			4.612	239.940	.000	.31806	.06896	.18222	.45390
time technostress	Equal variances assumed	3.529	.061	1.804	264	.072	.10948	.06068	-.01000	.22897
	Equal variances not assumed			1.861	258.355	.064	.10948	.05884	-.00639	.22535
workplace technostress	Equal variances assumed	.130	.718	-5.916	264	.000	-.42671	.07213	-.56873	-.28469
	Equal variances not assumed			-5.862	229.054	.000	-.42671	.07279	-.57013	-.28329
communication technostress	Equal variances assumed	3.486	.063	1.942	271	.053	.13322	.06859	-.00182	.26825
	Equal variances not assumed			2.002	260.921	.046	.13322	.06655	.00217	.26426
family technostress	Equal variances assumed	1.990	.159	-3.995	272	.000	-.30385	.07606	-.45359	-.15411
	Equal variances not assumed			-4.045	251.372	.000	-.30385	.07512	-.45179	-.15592
societal technostress	Equal variances assumed	8.880	.003	-8.525	268	.000	-.56843	.06668	-.69970	-.43715
	Equal variances not assumed			-8.115	194.465	.000	-.56843	.07005	-.70657	-.43028

Table 6a
Male Students versus Adult Males on Total Technostress and Learning, Boundary, Time and Workplace Technostress Sub Scales

Group Statistics[a]

	group students or adults (excludes an	N	Mean	Std. Deviation	Std. Error Mean
total technostress	student	37	2.5817	.33094	.05441
	adult	41	2.7538	.35480	.05541
learning technostress	student	37	2.1351	.81137	.13339
	adult	41	2.5549	.85057	.13284
boundary technostress	student	36	2.9398	.44925	.07488
	adult	41	2.6098	.60393	.09432
time technostress	student	36	2.8981	.49361	.08227
	adult	40	2.9083	.50879	.08045
workplace technostress	student	35	2.3079	.58800	.09939
	adult	40	2.6528	.59500	.09408

a. gender = male

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total technostress	Equal variances assumed	.203	.654	-2.209	76	.030	-.17216	.07794	-.32739	-.01694
	Equal variances not assumed			-2.217	75.910	.030	-.17216	.07766	-.32683	-.01749
learning technostress	Equal variances assumed	.012	.913	-2.224	76	.029	-.41974	.18871	-.79559	-.04389
	Equal variances not assumed			-2.230	75.755	.029	-.41974	.18825	-.79469	-.04479
boundary technostress	Equal variances assumed	4.707	.033	2.689	75	.009	.33006	.12273	.08558	.57454
	Equal variances not assumed			2.741	73.116	.008	.33006	.12043	.09006	.57006
time technostress	Equal variances assumed	.001	.976	-.088	74	.930	-.01019	.11525	-.23983	.21946
	Equal variances not assumed			-.089	73.569	.930	-.01019	.11506	-.23948	.21911
workplace technostress	Equal variances assumed	.017	.895	-2.518	73	.014	-.34484	.13696	-.61781	-.07187
	Equal variances not assumed			-2.520	71.901	.014	-.34484	.13685	-.61766	-.07202

a. gender = male

Table 6b
Female Students versus Adult Females on Total Technostress and Learning, Boundary, Time and Workplace Technostress Sub Scales

Group Statistics[a]

	group students or adults (excludes an	N	Mean	Std. Deviation	Std. Error Mean
total technostress	student	123	2.6795	.35333	.03186
	adult	72	2.8641	.37185	.04382
learning technostress	student	123	2.7581	.87071	.07851
	adult	72	3.1840	.90964	.10720
boundary technostress	student	122	2.9768	.59006	.05342
	adult	71	2.6737	.53112	.06303
time technostress	student	119	3.0756	.52713	.04832
	adult	71	2.9343	.38881	.04614
workplace technostress	student	120	2.3417	.56236	.05134
	adult	71	2.8216	.59613	.07075

a. gender = female

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total technostress	Equal variances assumed	.112	.738	-3.452	193	.001	-.18454	.05346	-.28998	-.07911
	Equal variances not assumed			-3.406	142.685	.001	-.18454	.05418	-.29164	-.07744
learning technostress	Equal variances assumed	.015	.903	-3.242	193	.001	-.42590	.13136	-.68498	-.16682
	Equal variances not assumed			-3.205	143.551	.002	-.42590	.13288	-.68854	-.16325
boundary technostress	Equal variances assumed	.835	.362	3.567	191	.000	.30307	.08496	.13549	.47065
	Equal variances not assumed			3.668	159.168	.000	.30307	.08263	.13988	.46625
time technostress	Equal variances assumed	4.908	.028	1.963	188	.051	.14136	.07203	-.00073	.28344
	Equal variances not assumed			2.116	179.591	.036	.14136	.06681	.00951	.27320
workplace technostress	Equal variances assumed	.118	.732	-5.574	189	.000	-.47993	.08611	-.64978	-.31007
	Equal variances not assumed			-5.491	140.249	.000	-.47993	.08741	-.65274	-.30712

a. gender = female

Table 7
All Males versus All Females on Total Technostress and Learning, Boundary, Time and Workplace Technostress Sub Scales

Group Statistics

	gender	N	Mean	Std. Deviation	Std. Error Mean
total technostress	male	78	2.6722	.35226	.03989
	female	195	2.7477	.37025	.02651
learning technostress	male	78	2.3558	.85330	.09662
	female	195	2.9154	.90667	.06493
boundary technostress	male	77	2.7641	.55892	.06369
	female	193	2.8653	.58629	.04220
time technostress	male	76	2.9035	.49834	.05716
	female	190	3.0228	.48392	.03511
workplace technostress	male	75	2.4919	.61273	.07075
	female	191	2.5201	.61893	.04478

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total technostress	Equal variances assumed	.618	.432	-1.543	271	.124	-.07551	.04893	-.17185	.02082
	Equal variances not assumed			-1.577	148.573	.117	-.07551	.04789	-.17015	.01913
learning technostress	Equal variances assumed	.686	.408	-4.684	271	.000	-.55962	.11948	-.79484	-.32439
	Equal variances not assumed			-4.807	150.101	.000	-.55962	.11641	-.78962	-.32961
boundary technostress	Equal variances assumed	.031	.860	-1.298	268	.196	-.10122	.07800	-.25478	.05235
	Equal variances not assumed			-1.325	146.220	.187	-.10122	.07641	-.25222	.04979
time technostress	Equal variances assumed	.464	.496	-1.801	264	.073	-.11930	.06624	-.24973	.01113
	Equal variances not assumed			-1.778	134.646	.078	-.11930	.06708	-.25197	.01338
workplace technostress	Equal variances assumed	.234	.629	-.336	264	.738	-.02822	.08410	-.19382	.13738
	Equal variances not assumed			-.337	136.635	.737	-.02822	.08373	-.19380	.13736

Table 8
Levels of Technostress among Older and Younger Teachers

Group Statistics

	YoungvsOldTeachers	N	Mean	Std. Deviation	Std. Error Mean
total technostress	young	49	2.7550	.29885	.04269
	old	39	2.8331	.40297	.06453
learning technostress	young	49	2.6633	.84093	.12013
	old	39	3.0064	.81209	.13004
boundary technostress	young	49	2.7449	.56119	.08017
	old	39	2.5342	.57504	.09208
time technostress	young	48	2.8843	.42074	.06073
	old	39	2.9573	.41856	.06702
workplace technostress	young	48	2.6782	.56574	.08166
	old	39	2.8405	.59278	.09492

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total technostress	Equal variances assumed	1.800	.183	-1.043	86	.300	-.07802	.07483	-.22678	.07073
	Equal variances not assumed			-1.008	68.203	.317	-.07802	.07737	-.23241	.07636
learning technostress	Equal variances assumed	.230	.633	-1.931	86	.057	-.34314	.17775	-.69650	.01021
	Equal variances not assumed			-1.938	82.797	.056	-.34314	.17704	-.69528	.00899
boundary technostress	Equal variances assumed	.021	.884	1.731	86	.087	.21071	.12175	-.03132	.45274
	Equal variances not assumed			1.726	80.724	.088	.21071	.12209	-.03222	.45364
time technostress	Equal variances assumed	.001	.976	-.807	85	.422	-.07301	.09049	-.25293	.10692
	Equal variances not assumed			-.807	81.561	.422	-.07301	.09044	-.25294	.10693
workplace technostress	Equal variances assumed	.408	.525	-1.302	85	.196	-.16222	.12460	-.40998	.08553
	Equal variances not assumed			-1.296	79.745	.199	-.16222	.12521	-.41141	.08698

Levels of Technostress among Older and Younger Male Teachers

Group Statistics[a]

	YoungvsOldTeachers	N	Mean	Std. Deviation	Std. Error Mean
total technostress	young	14	2.7298	.29784	.07960
	old	18	2.8168	.33380	.07868
learning technostress	young	14	2.1071	.63332	.16926
	old	18	2.8472	.67595	.15932
boundary technostress	young	14	2.8333	.56614	.15131
	old	18	2.4722	.60566	.14276
time technostress	young	13	2.9060	.46447	.12882
	old	18	2.9753	.45343	.10687
workplace technostress	young	14	2.5714	.59254	.15836
	old	18	2.8333	.53525	.12616

a. gender = male

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total technostress	Equal variances assumed	.249	.621	-.766	30	.450	-.08700	.11357	-.31895	.14494
	Equal variances not assumed			-.777	29.371	.443	-.08700	.11192	-.31578	.14177
learning technostress	Equal variances assumed	.098	.757	-3.157	30	.004	-.74008	.23441	-1.21881	-.26135
	Equal variances not assumed			-3.184	28.895	.003	-.74008	.23245	-1.21557	-.26459
boundary technostress	Equal variances assumed	.036	.850	1.721	30	.096	.36111	.20984	-.06744	.78966
	Equal variances not assumed			1.736	28.921	.093	.36111	.20802	-.06439	.78661
time technostress	Equal variances assumed	.000	.996	-.416	29	.681	-.06933	.16671	-.41029	.27164
	Equal variances not assumed			-.414	25.632	.682	-.06933	.16738	-.41363	.27498
workplace technostress	Equal variances assumed	.000	.998	-1.311	30	.200	-.26190	.19984	-.67003	.14622
	Equal variances not assumed			-1.294	26.557	.207	-.26190	.20247	-.67767	.15386

a. gender = male

Levels of Technostress among Older and Younger Female Teachers

Group Statistics[a]

	YoungvsOldTeachers	N	Mean	Std. Deviation	Std. Error Mean
total technostress	young	35	2.7651	.30298	.05121
	old	21	2.8470	.46193	.10080
learning technostress	young	35	2.8857	.81652	.13802
	old	21	3.1429	.90682	.19788
boundary technostress	young	35	2.7095	.56352	.09525
	old	21	2.5873	.55682	.12151
time technostress	young	35	2.8762	.41026	.06935
	old	21	2.9418	.39693	.08662
workplace technostress	young	34	2.7222	.55740	.09559
	old	21	2.8466	.65119	.14210

a. gender = female

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
total technostress	Equal variances assumed	1.903	.173	-.802	54	.426	-.08187	.10210	-.28658	.12283
	Equal variances not assumed			-.724	30.463	.475	-.08187	.11307	-.31264	.14889
learning technostress	Equal variances assumed	.088	.768	-1.095	54	.279	-.25714	.23492	-.72813	.21384
	Equal variances not assumed			-1.066	38.791	.293	-.25714	.24126	-.74522	.23094
boundary technostress	Equal variances assumed	.069	.794	.789	54	.433	.12222	.15486	-.18826	.43271
	Equal variances not assumed			.792	42.657	.433	.12222	.15439	-.18921	.43366
time technostress	Equal variances assumed	.036	.851	-.586	54	.560	-.06561	.11189	-.28994	.15873
	Equal variances not assumed			-.591	43.374	.557	-.06561	.11096	-.28932	.15810
workplace technostress	Equal variances assumed	.574	.452	-.754	53	.454	-.12434	.16501	-.45531	.20663
	Equal variances not assumed			-.726	37.539	.472	-.12434	.17126	-.47118	.22250

a. gender = female

Table 9
Mann-Whitney U tests for Students versus Adults

Ranks

	group students or	N	Mean Rank	Sum of Ranks
communication technostress	student	161	143.95	23175.50
	adult	112	127.01	14225.50
	Total	273		
family technostress	student	161	122.07	19653.50
	adult	113	159.48	18021.50
	Total	274		
societal technostress	student	157	105.95	16633.50
	adult	113	176.56	19951.50
	Total	270		
your feelings about technology	student	160	115.59	18494.00
	adult	107	161.53	17284.00
	Total	267		
best describe your technology knowledge	student	163	116.33	18961.00
	adult	113	170.49	19265.00
	Total	276		

Test Statistics[a]

	communication technostress	family technostress	societal technostress	your feelings about technology	best describe your technology knowledge
Mann-Whitney U	7897.500	6612.500	4230.500	5614.000	5595.000
Wilcoxon W	14225.500	19653.500	16633.500	18494.000	18961.000
Z	-1.751	-3.873	-7.347	-5.034	-5.882
Asymp. Sig. (2-tailed)	.080	.000	.000	.000	.000

a. Grouping Variable: group students or adults (excludes an 18 -25 yr old student)

Table 10a/b
SPSS Output for Table 10a and 10b
Correlation of Total Technostress, Technostress factors & Technology questions

Correlations

			Emotional Stability total score from TIPI scale	Openness to Experiences total score from TIPI scale
Spearman's rho	total technostress	Correlation Coefficient	-.168**	-.093
		Sig. (1-tailed)	.003	.063
		N	272	273
	learning technostress	Correlation Coefficient	-.195**	-.341**
		Sig. (1-tailed)	.001	.000
		N	272	272
	boundary technostress	Correlation Coefficient	.018	.039
		Sig. (1-tailed)	.382	.263
		N	269	270
	communication technostress	Correlation Coefficient	-.152**	-.007
		Sig. (1-tailed)	.006	.457
		N	272	273
	time technostress	Correlation Coefficient	-.173**	.043
		Sig. (1-tailed)	.002	.244
		N	265	266
	family technostress	Correlation Coefficient	-.022	.032
		Sig. (1-tailed)	.356	.297
		N	272	273
	workplace technostress	Correlation Coefficient	-.131*	-.059
		Sig. (1-tailed)	.017	.171
		N	265	266
	societal technostress	Correlation Coefficient	-.021	-.014
		Sig. (1-tailed)	.365	.407
		N	269	270
	your feelings about technology	Correlation Coefficient	-.039	-.170**
		Sig. (1-tailed)	.262	.003
		N	266	266
	best describe your technology knowledge	Correlation Coefficient	-.120*	-.210**
		Sig. (1-tailed)	.024	.000
		N	274	275

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Table 11
Anova Comparison using Tukeys HSD

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
total technostress	Between Groups	.877	3	.292	2.471	.064
	Within Groups	18.573	157	.118		
	Total	19.450	160			
learning technostress	Between Groups	3.135	3	1.045	1.318	.271
	Within Groups	124.498	157	.793		
	Total	127.633	160			
boundary technostress	Between Groups	1.448	3	.483	1.562	.201
	Within Groups	47.874	155	.309		
	Total	49.321	158			
time technostress	Between Groups	1.711	3	.570	2.141	.097
	Within Groups	40.477	152	.266		
	Total	42.188	155			
workplace technostress	Between Groups	1.810	3	.603	1.922	.128
	Within Groups	47.720	152	.314		
	Total	49.530	155			

Multiple Comparisons

Tukey HSD

Dependent Variable	(I) school type	(J) school type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
total technostress	community college	Fee paying	.07402	.09472	.863	-.1719	.3200
		Vec	-.00791	.10291	1.000	-.2751	.2593
		Comprehensive	.20205	.10478	.220	-.0700	.4741
	Fee paying	community college	-.07402	.09472	.863	-.3200	.1719
		Vec	-.08192	.06910	.637	-.2614	.0975
		Comprehensive	.12803	.07185	.286	-.0585	.3146
	Vec	community college	.00791	.10291	1.000	-.2593	.2751
		Fee paying	.08192	.06910	.637	-.0975	.2614
		Comprehensive	.20995	.08235	.056	-.0039	.4238
	Comprehensive	community college	-.20205	.10478	.220	-.4741	.0700
		Fee paying	-.12803	.07185	.286	-.3146	.0585
		Vec	-.20995	.08235	.056	-.4238	.0039
learning technostress	community college	Fee paying	-.27961	.24494	.664	-.9157	.3564
		Vec	-.25694	.26756	.772	-.9517	.4378
		Comprehensive	.04356	.27128	.999	-.6609	.7480
	Fee paying	community college	.27961	.24494	.664	-.3564	.9157
		Vec	.02266	.18017	.999	-.4452	.4905
		Comprehensive	.32317	.18564	.306	-.1589	.8052
	Vec	community college	.25694	.26756	.772	-.4378	.9517
		Fee paying	-.02266	.18017	.999	-.4905	.4452
		Comprehensive	.30051	.21461	.501	-.2568	.8578
	Comprehensive	community college	-.04356	.27128	.999	-.7480	.6609
		Fee paying	-.32317	.18564	.306	-.8052	.1589
		Vec	-.30051	.21461	.501	-.8578	.2568
boundary technostress	community college	Fee paying	-.08953	.15322	.937	-.4875	.3084
		Vec	-.27646	.16629	.347	-.7083	.1554
		Comprehensive	-.03125	.17016	.998	-.4732	.4107
	Fee paying	community college	.08953	.15322	.937	-.3084	.4875
		Vec	-.18694	.11190	.343	-.4776	.1037
		Comprehensive	.05828	.11758	.960	-.2471	.3637
	Vec	community college	.27646	.16629	.347	-.1554	.7083
		Fee paying	.18694	.11190	.343	-.1037	.4776
		Comprehensive	.24521	.13416	.264	-.1032	.5936
	Comprehensive	community college	.03125	.17016	.998	-.4107	.4732
		Fee paying	-.05828	.11758	.960	-.3637	.2471
		Vec	-.24521	.13416	.264	-.5936	.1032
time technostress	community college	Fee paying	.18151	.14245	.581	-.1885	.5515
		Vec	.23765	.15505	.421	-.1651	.6404
		Comprehensive	.38262	.15885	.080	-.0300	.7953
	Fee paying	community college	-.18151	.14245	.581	-.5515	.1885
		Vec	.05615	.10510	.951	-.2169	.3292
		Comprehensive	.20111	.11063	.269	-.0863	.4885
	Vec	community college	-.23765	.15505	.421	-.6404	.1651
		Fee paying	-.05615	.10510	.951	-.3292	.2169
		Comprehensive	.14496	.12644	.661	-.1835	.4734
	Comprehensive	community college	-.38262	.15885	.080	-.7953	.0300
		Fee paying	-.20111	.11063	.269	-.4885	.0863
		Vec	-.14496	.12644	.661	-.4734	.1835
workplace technostress	community college	Fee paying	.08153	.15467	.952	-.3203	.4833
		Vec	.05324	.16835	.989	-.3841	.4906
		Comprehensive	.32594	.17248	.237	-.1221	.7740
	Fee paying	community college	-.08153	.15467	.952	-.4833	.3203
		Vec	-.02829	.11411	.995	-.3247	.2681
		Comprehensive	.24441	.12012	.180	-.0676	.5564
	Vec	community college	-.05324	.16835	.989	-.4906	.3841
		Fee paying	.02829	.11411	.995	-.2681	.3247
		Comprehensive	.27270	.13729	.198	-.0839	.6293
	Comprehensive	community college	-.32594	.17248	.237	-.7740	.1221
		Fee paying	-.24441	.12012	.180	-.5564	.0676
		Vec	-.27270	.13729	.198	-.6293	.0839

Table 12
Kolmogorov-Smirnov Output

One-Sample Kolmogorov-Smirnov Test

		total technostress	learning technostress	boundary technostress	time technostress	workplace technostress
N		274	274	271	267	267
Normal Parameters[a,b]	Mean	2.7261	2.7573	2.8358	2.9888	2.5127
	Std. Deviation	.36548	.92431	.57841	.48920	.61508
Most Extreme Differences	Absolute	.031	.073	.062	.060	.057
	Positive	.031	.073	.062	.058	.057
	Negative	-.023	-.056	-.060	-.060	-.037
Kolmogorov-Smirnov Z		.507	1.211	1.012	.976	.925
Asymp. Sig. (2-tailed)		.959	.107	.257	.297	.359

a. Test distribution is Normal.

b. Calculated from data.

One-Sample Kolmogorov-Smirnov Test

		communication technostress	family technostress	societal technostress	group students or adults (excludes an 18 -25 yr old student)	Your feelings about technology	Best describe your technology knowledge	Extraversion total score from TIPI scale	Agreeableness total score from TIPI scale	Conscientiousness total score from TIPI scale	Emotional Stability total score from TIPI scale	Openness to Experiences total score from TIPI scale
N		274	275	271	278	268	277	277	275	277	274	275
Normal Parameters[a,b]	Mean	2.2001	3.5045	2.5982	1.4094	2.25	2.07	4.9801	4.9018	5.0758	4.8212	5.3764
	Std. Deviation	.56017	.63700	.60761	.49262	.926	.910	1.33126	1.13077	1.36056	1.33526	1.10043
Most Extreme Differences	Absolute	.114	.109	.090	.388	.235	.246	.132	.101	.113	.107	.134
	Positive	.114	.109	.090	.388	.235	.246	.072	.101	.079	.056	.070
	Negative	-.062	-.094	-.040	-.294	-.176	-.180	-.132	-.100	-.113	-.107	-.134
Kolmogorov-Smirnov Z		1.887	1.815	1.479	6.440	3.845	4.101	2.198	1.669	1.887	1.768	2.219
Asymp. Sig. (2-tailed)		.002	.003	.025	.000	.000	.000	.000	.008	.002	.004	.000

a. Test distribution is Normal.

b. Calculated from data.