'Do Facebook Usage Patterns Influence Individuals' ICT Engagement?'

by

Jamie Douglas Robertson

Submitted to the School of Information Management,

Victoria University of Wellington

in partial fulfilment of the requirements for the degree of

Master of Information Studies

June 2016

i. Contents

ii. Abstract

Research problem

Information Communication Technology (ICT) access and information literacy appear to be increasingly linked with individuals' personal, social, educational, vocational and economic outcomes. Social media, especially Facebook, is increasingly ubiquitous amongst online adults, and some studies have found significant negative correlations between social media and educational outcomes, and also in some contexts positive correlations.

If Facebook usage patterns significantly influence ICT engagement, then they therefore may also impact on users' broad socioeconomic outcomes and well-being.

Methodology

This research is based in the quantitative tradition, and is a cross-sectional correlational study.

Questionnaire instruments were used, as quantitative approaches using questionnaire instruments have previously been successfully used in cross-sectional studies to measure ICT engagement and educational outcomes. The instruments were designed to measure three variables: individuals' average duration of weekly Facebook access; average frequency of the same; and ICT engagement. Inferential statistical analyses were used to determine correlations between the Facebook usage variables and ICT engagement.

The target population was online New Zealanders (this limit was imposed to assist feasibility) aged 16 and over. To maximise representativeness and minimise sampling bias, links to the questionnaire instrument were offered to the general public via public libraries across New Zealand.

Results

While there was no significant correlation found between the duration of users' average weekly Facebook access and ICT engagement, a significant (though weak) positive correlation of .279 at the 0.01 level (two-tailed) using the Pearson product moment correlation.

Interestingly, Facebook access frequency and Facebook access duration were also similarly significantly positively correlated, though here only at .299. This suggests that while users' frequency of access and duration of access patterns do influence one another, there is a wide range of effect of this influence. Thus it appears that users' Facebook access patterns can be quite varied and heterogeneous, at least so far as the combinations of duration and frequency of access are concerned.

Implications

Due to methodological limitations, as discussed in this report, further research and replication of the findings is advised to better inform the consideration of implications of this research's results on digital divide issues and broad socioeconomic outcomes, and the subsequent recommendations for updates to information professionals' practice or governmental policy in these areas.

Based on the findings of this report, it appears possible that facilitating users' frequent access to Facebook (and perhaps, speculatively at this stage, across a variety of devices e.g. desktop computer, laptop, pad or tablet, smartphone etc.) could have a significant positive impact on overall ICT engagement. Due to digital divide issues and the possible relationship between ICT engagement and broad social outcomes, this may raise issues of governmental and information professional obligation to work deliberately to facilitate said access, particularly for individuals and groups characterised by low Socioeconomic Status (SES) or ICT access groups. This might include funding

300326779

and educational workshops directed at assisting and advocating Facebook access in a broader range of contexts and devices throughout individuals' daily activities.

As a correlational study though, an important caveat is that the direction of causation (if causation indeed exists) is naturally unclear.

Keywords

Facebook, social media, digital divide, Information communication technologies, ICT, ICT engagement, information literacy, socioeconomic status

1. Introduction

1.1. The Research Problem

In modern society, Information Communication Technology (ICT)[1] access and information literacy[2] appear increasingly linked with individuals' personal, social, educational, vocational and economic outcomes (Crothers et al, 2016; Hilbert, 2016; Warschauer, 2010; Halewood & Kenny, 2008).

The demographic inequities around individuals' ICT access and information literacy skills, and thus socioeconomic outcomes, are typically termed the 'digital divide'[3]; the evidence appears to suggest this divide is probably steadily worsening rather than improving, although this is dependent to an extent on the metrics used, and some research and reviews considers this contentious (Crothers et al, 2016; Hilbert, 2016; Gibson et al, 2013; Blanchard et al., 2008).

Today, 47% of low-income families (low-income defined here by Crothers et al. as those with a reported income of less than $35, 000 annually) are defined categorically as "non-users" by the 2015 World Internet Project New Zealand; there are also sharp contrasts between ethnic groups, with 22% of Pasifika respondents defined as "non-users" vs only 2% of Asian participants (Crothers et al, 2016). Even general literacy has in some contexts been demonstrated to be significantly affected by ICT access and information literacy skills (Morrell, 2011; Itō, 2010).

Social media, especially Facebook, is increasingly ubiquitous amongst online adults and youth; on a national level in particular, there are now over 2 million New Zealanders regularly using Facebook on a daily basis (Duggan & Smith, 2013; Tess, 2013; Nielsen, 2015). Both significant negative and positive correlations have been found between social media usage patterns and a range of educational outcomes; however the available empirical evidence is not yet considered by most to be as robust and comprehensive as would be ideal for making policy and professional practice recommendations (Kitsantas, Chirinos, Hiller & Kitsantas, 2016; Saha & Karpinski, 2016; Rouis, Limayem & Salehi-Sangari, 2015; Tess, 2013; Junco & Cotten, 2012).

Could Facebook usage significantly influence ICT engagement[4], and therefore broad socioeconomic outcomes and well-being? There appears to be a legitimate research gap here with significant potential implications.

1.2. The Study Objective

This correlational study aimed to address this research gap by assessing how Facebook usage patterns might affect or influence the level of individuals' ICT engagement, and therefore potentially, albeit indirectly, digital divide inequities and broad socioeconomic outcomes and well-being; though the latter will not be directly examined by this study.

1.3. Rationale and Significance of Study

As has been outlined in section 1.1. above, there is considerable accumulated evidence that ICT access and information literacy skills are strongly correlated with digital divide inequities. ICT engagement is a key factor of ICT access and information literacy skills and encompasses them to an extent; ICT engagement itself might therefore exacerbate or mitigate digital divide inequities and ultimately broad socioeconomic outcomes.

---

[1] See definition in section 1.4.1.
[2] See definition in section 1.4.3.
[3] See definition in section 1.4.4.
[4] See definition in section 1.4.2.

If Facebook access patterns can positively and negatively affect educational outcomes, it may also improve or worsen ICT engagement. As such, individuals' Facebook usage might also itself (albeit indirectly) impact socioeconomic outcomes and quality of life. And while it is possible that eventually Facebook's significance will recede or disappear entirely, it has shown only increase in use and significance over the last twelve years, and moreover it appears that if this trend changed, it would more likely that Facebook would be eclipsed or supplanted by a social media competitor than for social media as a whole to decrease in significance at any point in the near future (Carlson et al, 2016; Crothers et al, 2016; Naslund, Aschbrenner, Marsch & Bartels, 2016; Nielsen, 2015; Tess, 2013).

While this study proposes to examine only the relationship of Facebook usage patterns to ICT engagement, it may serve as an initial launching pad for future research into Facebook's and other social media platforms' relationship to broader information literacy and digital divide inequities.

With socioeconomic implications of this magnitude, support for the rationale and significance of this correlational study appears well founded and robust.

1.4 Key Term Definitions

1.4.1. ICTs

Information and Communication Technologies—encompassing converging technologies, both software and hardware, used in "telecommunications, broadcast media… audiovisual processing and transmission systems, and network-based control and monitoring functions"— typically experienced by end-users via manifestations like smart devices, desktops/laptops, pads, cellphones, operating systems, apps and similar (Techopedia, 2016b).

1.4.2. ICT Engagement

The nature, level and extent of individual's ICT access patterns; an accretion of factors such as number and variety of devices used to access information, number and variety of activities performed online, information literacy skills, amount of time spent online and likelihood of engaging directly without using perceived experts as guide or proxy access (Crothers et al, 2016; Gibson et al, 2013).

1.4.3. Information Literacy

The ability to effectively identify information needs, to find, retrieve, evaluate and use relevant information resources, as well as communicate information in various forms (Wesleyan University, 2016; National Forum on Information Literacy, 2015).

1.4.4. The Digital Divide

Differences in broad socioeconomic outcomes and quality of life believed to result from differences in ICT access, ICT engagement and information literacy skills. Typically concerns key demographic differences between rural/urban, ethnic groups, income and educational levels (Techopedia, 2016a; Warschauer, 2010).

2. Literature Review

This review of the current literature analyses research papers and reviews relevant to Facebook usage patterns' influence on ICT engagement, in order to better establish a theoretical framework to ground this correlational study. It examines existing contemporary literature concerning the relationship(s) between educational outcomes and ICT use in general, and then focuses in particular on social media and its impact on educational outcomes.

2.1. ICT Use and Educational Outcomes

2.1.1. Theory and Concepts

Research into ICT use and educational outcomes tends to rely on a selection of research-backed concepts with direct and demonstrable utility, rather than formal theory.

A number of research-based concepts form the foundation of Biagi & Loi 's (2013) literature review on ICT use and educational outcomes. The 2009 PISA ICT familiarity questionnaire (and furnished information about students' ICT usage) is foundational, and expanded in particular by Scheuermann and Pedrò's model of micro[5], meso[6] and macro[7] factor levels (Scheuermann and Pedrò, 2009, cited in Biagi & Loi, 2013; Biagi & Loi, 2013).

Similarly, to assess the relationship of computer use to science scores, Spiezia's (2010) review uses the relevant OECD Programme for International Student Assessment (PISA) 2009 survey results.

A comparable instrument comprises Jarnieson-Proctor et al.'s (2007) framework: the 45-item 'ICT Curriculum Integration Performance Measurement Instrument', developed by Proctor, Watson and Finger (2003).

2.1.2. Objectives

Both Biagi & Loi's (2013) and Spiezia's (2010) reviews aim to measure the relationship of ICT use to educational outcomes. Biagi & Loi (2013) examine correlations between student's academic test results[8] and ICT usage intensity and type; Spiezia (2010) focuses on home/classroom computer use and science scores.

Correspondingly, Proctor, Watson and Finger's (2003) instrument is used by Jarnieson-Procter et al.'s (2007) to assess the effects of classroom ICT integration on Australian students' educational outcomes; although this objective is secondary to assessing the robustness and validity of the instrument itself.

Other research has taken an exploratory approach, gathering broad data on ICT use and educational outcomes and looking for patterns to build theories from (Ivan & Frunzaru, 2014; Shear et al., 2014; Fu, 2013; Wastiau et al., 2013; De Koster, 2012; Song & Kang, 2012).

2.1.3. Design and Methodologies

Incorporating the 2009 PISA ICT familiarity questionnaire and its results, Biagi and Loi's (2013) review provides useful background, enabling the identification of typical ICT activities of 15 year old students across 23 European nations. They use Scheuermann and Pedrò's model[9] to enhance examination of relationships between student's ICT use in the home, classroom and elsewhere; improving on prior conceptualisations that focussed on simplistic school vs. home dichotomies (Biagi & Loi, 2013). The PISA 2009 results also form the basis of Spiezia's (2010) review.

929 teachers from Queensland, Australia completed the ICT Curriculum Integration Performance Measurement Instrument questionnaire for Jarnieson-Proctor et al.'s (2007) quantitative, cross-

---

[5] Student and family characteristics

[6] School characteristics

[7] Institutional characteristics

[8] As measured by PISA English, mathematics and science test results

[9] The Micro (Student/Family), Meso (School) and Macro (Institutional) factor levels of student ICT engagement

300326779

sectional study. 133 were from low SES schools; 268, mid-low; 372, mid-high; 156, high (Jarnieson-Proctor et al., 2007). However this methodology may be prone to self-report bias, via reliance on teachers' perceptions of themselves and their students.

Additional research in this area tends to employ similar design and methodology (Ivan & Frunzaru, 2014; Song et al., 2013; Wastiau et al., 2013; Song & Kang, 2012; Sang et al., 2011).

2.1.4. Findings

Interestingly, Biagi & Loi (2013) find gaming to be the only ICT activity showing positive correlation between intensity of use and educational outcomes.[8] Other activities, despite being ostensibly more educationally-relevant, are correlated with decreased educational outcomes[8] for all but three (Norway, Portugal and the Slovak Republic) of the twenty-three sampled countries.

Also interesting are results from research with Korean primary, middle and high school students: different elements of ICT engagement and information literacy had different effects on achievement; information communication and transactions appear to negatively impact mathematics achievement, and ICT self-efficacy is most closely linked to positive academic outcomes (Song & Kang, 2012). Further research appears to confirm the differential influences of distinct ICT engagement elements (Shear et al., 2014; Fu, 2013; De Koster, 2012; Sang et al., 2011). Wastiau et al.'s (2013) review also supports ICT self-efficacy's influence on educational outcomes.

These diverse results suggest further research is in order, to better examine any socially significant relationships between ICT use and educational outcomes.

More expected results are obtained by Jarnieson-Proctor et al. (2007) and Spiezia (2010), who find classroom ICT use improves teaching and learning. The external validity of Jarnieson-Proctor et al.'s (2007) results may be limited by the study's primary focus on testing the utilised instrument, measuring the relationship between ICT use and educational outcomes only secondarily. Caveats similarly exist for Spiezia's (2010) review, with its specific focus on computer use and science scores; though Spiezia contends that as PISA science, English and maths scores are strongly correlated, their science scores are generalisable.

Further research supports the link between ICT use and educational outcomes. Ivan and Frunzaru's (2014) study of Romanian university students finds positive correlations between academic ICT usage and achieved grades. Jo Shan's (2013) review cites varied examples of different ways ICT usage can improve both learning and teaching quality, further supporting Song and Kang's (2012) finding that different elements of ICT have diverse impacts on educational outcomes.

Indeed, the frequent emphasis on hardware access over teacher/student information literacy skills appears disadvantageous (Ki-Sang et al, 2013; Wastiau et al., 2013; De Koster, 2012). Shear et al.'s (2014) explorative case study suggests the significant influence of teachers' own ICT understandings and pedagogical practices, as does Guoyuan et al.'s (2011) cross-sectional study.

These findings however generally lack true experimental data from utilisation of proper treatment and control groups, with the exception of Spiezia (2010), which could isolate the potential influence of the independent variable of ICT use on the dependent variable of educational outcomes. This restricts their external validity and generalizability to other contexts. The research reviewed also lacks longitudinal studies, focusing instead cross-sectional.

2.2. Social Media and Educational Outcomes

As previously mentioned, social media in particular seems to have a special and significant influence on educational outcomes. As such, this review now focuses on social media's impact.

2.2.1. Theory and Concepts

Junco & Cotten (2012) do not utilise major underpinning theory. They instead reference Chun, Golomb and Turk-Browne's (2011) concept that burgeoning mobile ICT usage and increasing exposure to information has led to frequent multitasking as an information management strategy, but people still struggle to remember and process all information they attend to daily.

Formal theory is not referenced by Karpinski, Kirschner, Ozer, Mellott & Ochwo (2013) either. They use a few key concepts from the research literature, such as frequent task-switching relationship to poorer learning and task performance, and multitasking leading to decreased productivity and accuracy in academic settings (Karpinski et al, 2013).

Similar ad hoc approaches are taken by Backer (2012) and Pasek and Hargittai (2009).

2.2.2. Objectives

Does multitasking involving social media, in particular Facebook and text messaging, impact student's Grade Point Averages (GPA)? Juno and Cotten's (2012) aim to answer this question by analysing multitasking's influence as a moderating variable on the relationship between social media use and educational outcomes. Karpinski et al. (2013) corresponds closely. They differ in their focus on *international* academic performance, and identification of quantitative and qualitative social media use; assessing both frequency/duration of use and nature/type of use.

Pasek and Hargittai (2009) are unconvinced of findings of negative correlations between Facebook usage and educational outcomes, and aim to discern whether a connection actually exists.

Contrastingly, Backer's (2012) exploratory study sought to investigate the effects on students' motivation concerning Facebook use as part of an assessment.

2.2.3. Design and Methodologies

Believing that other research lacked robust data, Pasek and Hargittai (2009) performed an analysis of three data sets: a sizeable sample of University of Illinois students, and both cross-sectional and longitudinal samples of Americans aged 14-23. Data was obtained via a combination of purposely-developed questionnaires and surveys conducted by the Adolescent Risk Communication Institute (Pasek & Hargittai, 2009).

Juno and Cotten's (2012) quantitative and cross-sectional study had a sample size of 1774. They had participating students fill out online surveys, asking them to estimate the frequency and duration of their ICT usage, as well as multitasking frequency, and then provide access to their GPAs (Juno & Cotten, 2012).

Attempting to remedy the parochial nature of similar studies, Karpinski et al. (2013) assessed an 'international' sample of students' GPAs scores. However they sampled only 451 US students and 406 European students, with 88.6% identifying as Caucasian, and over 70% female (Karpinski et al., 2013).

Being cross-sectional studies and not true experimental designs, internal validity again might be limited, and only correlation and not causational mechanisms can be inferred from the results. There may be mediating or confounding variables that have a causational relationship with GPA results: students with lower academic results might be more likely to be distracted by ICTs; those with higher results, more resilient. Students estimating their own ICT and multitasking behaviours also carries the risk of self-perception biases, and false reports with self-disclosed GPA scores. Juno and Cotten's (2012) sample is also restricted to the north-eastern US.

300326779

There are also issues with external validity in Karpinski et al.'s (2013) study: do their findings also readily apply students outside the US and Europe, and non-Caucasians? Culture has a significant impact on communication, relationships and social interaction (Taras, Kirkman & Steel, 2010). The high proportion of female participants also means the results may not be as applicable to males.

Backer's (2010) qualitative research applied thematic analysis to brief interviews with twelve college students concerning their perception of using Facebook as a platform to complete a course assessment. Internal validity may be undermined by self-report bias; external by the small, unrepresentative sample.

Given the methodological limitations outlined above, a study at least providing longitudinal data to reinforce the above cross-sectional studies' findings is recommended; a true experimental design, with randomised allocation to treatment and control groups, would be ideal.

2.2.4. Findings

Some studies have found negative correlations between social media usage and students' GPAs (Karpinski et al., 2013; Juno & Cotten, 2012; Kirschner & Karpinski, 2010; Karpinski & Duberstein, 2009). Others have failed to replicate such correlations, even suggesting the reverse may be true (Pasek and Hargittai, 2009). It appears distinct social media usage patterns may be associated with different educational outcomes, congruent with the findings concerning more general ICT use.

Frequency of multitasking (Facebook and text messaging) appears significantly negatively correlated with college students' GPA; emailing, instant messaging and talking on phones are not found to be associated however (Juno & Cotten, 2012). Juno and Cotten (2012) go on to cite a dozen other research papers they claim support their contention that multitasking with other ICTs should similarly impact on GPAs.

Interestingly, only American students were found by Karpinski et al.'s (2013) study to have been significantly influenced by multitasking. Europeans seemed exempt. Given this result, and the methodological limitations outlined above, this appears to be a significant area that could benefit from further investigation.

Social media use may also improve educational outcomes in less direct ways. Ahn's (2011) review suggests that social media encourages valuable social intelligence skills, and that further research is needed on social media applications specifically designed for education and 'social learning behaviours', as these may augment academic outcomes.

Of the twelve students participating in Backer's (2010) study, eleven reported that using Facebook to complete their assessment improved their motivation, and nine that they felt they had learnt more. While the subjectivity of this data and small sample limits its generalisability, the results indicate future research here may be promising.

2.3. Concluding Remarks

The reviewed literature shows a common, persistent link between educational outcomes and ICT use, especially where social media use is concerned.

Much of the research highlights different facets of ICT engagement's differential impacts on areas of achievement, and that the tendency for emphasis on hardware access over information literacy skills may negatively affect educational outcomes (Jo Shan, 2013; Song et al, 2013; Wastiau et al., 2013; De Koster, 2012; Song & Kang, 2012).

There appears to be a research gap concerning how social media, particularly Facebook, may act as a moderating variable between ICT access and ICT engagement.

Given Facebook's present ubiquity and the digital divide's impact on broad socioeconomic outcomes and quality of life, significant benefits may be gained from addressing this research gap, particularly with a focus on the different effects of heterogeneous and diverse usage patterns.

3. Research Questions

3.1. Main research question

The main research question supporting this study's objective is:

Does Facebook usage impact on ICT engagement levels?

The sub-research questions facilitating the main research question are:

3.1.1. Sub-research question 1

Do Facebook access duration patterns demonstrate significant correlations with general ICT engagement patterns?

3.1.2. Sub-research question 2

Do Facebook access frequency patterns demonstrate significant correlations with general ICT engagement patterns?

3.2. Hypotheses

3.2.1. Hypothesis 1: statistically significant correlations between Facebook usage and ICT

It was hypothesised that statistically significant correlations between some Facebook usage patterns and ICT familiarity scores would be found.

3.2.2. Hypothesis 2: correlations vary as Facebook patterns vary

Based on the review of relevant literature, it is additionally hypothesised the data would show different Facebook usage patterns to be correlated with different ICT engagement outcomes; that certain patterns of usage might improve ICT familiarity scores, others worsen it, and others have no significant impact.

3.2.3. Hypothesis 3: high duration correlates with high ICT familiarity, high frequency with low

It also is hypothesised that high duration Facebook usage will be correlated with good ICT familiarity scores outcomes, and high frequency with poor ICT familiarity scores.

3.2.4. Testing Null Hypotheses

For the purposes of this study though the associated null hypotheses, that there are no correlations between the variables mentioned above, will be tested.

4. Research Design

Based in the quantitative tradition, this research constitutes a cross-sectional correlational study.

5. Methodology and Methods

Quantitative approaches utilising questionnaire instruments have been successfully used in previous cross-sectional studies to measure ICT engagement and educational outcomes (Biagi & Loi, 2013; Jarnieson-Proctor et al., 2007). In light of this, it appears reasonably likely that such methodology would also suit this study as well.

This correlational study similarly employs specially designed questionnaire instruments, to obtain data on individuals' Facebook usage and ICT engagement. Inferential statistical analyses have been conducted to determine correlations between Facebook usage patterns, specifically average weekly frequency of access and average weekly duration of access in minutes, and ICT engagement patterns, specifically ICT familiarity score in an instrument adapted from PISA's ICT Familiarity Questionnaire (PISA, 2016; PISA, 2008).

5.1. Population and sample

The selected target population is online New Zealanders aged 16 and over (this limit imposed to assist feasibility); Leedy and Ormond (2013, p. 215-216) suggest that for any population over 5,000 a sample of over 400 would be adequate.

As such, this correlational study aimed to collect completed surveys of at least 400 online New Zealanders aged 16 and over. At the close of the survey data collection period, however, only 148 completed surveys were obtained. The limitations and methodological issues imposed by this shortfall are examined in further detail in the discussion section below.

To maximise representativeness and minimise sampling bias, links to the prospective survey online were distributed amongst New Zealand public libraries and offered to the general public.

It is possible that targeting library patrons may bias the results, due to traits and dispositions specific to or common in regular library users over the age of 16 years. However, public libraries are typically patronised by a diverse range of users representative of their broader communities, and have advantageous and comparatively extensive 'reach' into society (Lianza, 2016; Auckland Libraries Business Plan 2013-14, 2014; Goulding, 2013).

5.2. Data collection

Ideally, individuals' ICT engagement would have been exclusively assessed with the recently released and socially and technologically updated 2015 version of the PISA ICT Familiarity Questionnaire, adapted as necessary to fit the general New Zealand population (PISA, 2016; Biagi & Loi, 2013; PISA, 2008).

As the full updated 2015 version was not available without significant commercial investment however, it was necessary to rely on the framework from 2009 and update and adapt where necessary and possible, using the 2015 draft framework as the primary guide with additional insights from the 2015 Internet in New Zealand report, Statistics New Zealand and Lianza's 2016 facts and figures report (Crothers et al, 2016; Lianza, 2016; PISA, 2016). This significantly limits both the validity and probably the internal reliability of this component of the questionnaire instrument, and thus the data collected for the ICT familiarity variable and the finding of a significant (though weak) correlation with Facebook access frequency patterns.

5.2.1. ICT familiarity score variable

ICT engagement has thus been measured by (adapted and modified) PISA ICT familiarity score results. This variable constitutes parametric, discrete, interval data (as while it is possible to obtain a score of zero, it probably does not constitute a true zero point in the sense of a complete absence of

the characteristic of ICT familiarity; or at least not for anyone both willing and able to participate in an online survey instrument).

5.2.2. Duration and frequency of Facebook access variables

A second component to the questionnaire has additionally been constructed to analyse the average weekly duration (in minutes) and frequency of individuals' Facebook usage patterns. Both these measures constitute parametric, continuous, ratio data; as in both cases it is possible to obtain a score of zero and for this to be a true zero point.

5.3. Data analysis

In order to assess the direction and strength of correlations between duration and frequency of Facebook access and ICT familiarity scores, inferential statistical analyses would be employed. SPSS would be used to run factor analysis procedures. As the ICT familiarity score is a parametric, discrete, interval variable, and the Facebook frequency and duration variables are parametric, continuous, ratio variables, the Pearson product moment correlation appears the most appropriate correlational statistic (Kent State University; 2016; Laerd Statistics, 2016; Leedy & Omrod, 2013).

A two-tailed test of correlation has been employed in all instances, as this study seeks effects in either direction, and no pre-judgement has been made about the directionality of differences in order to reduce methodological bias issues and maximise external validity (UCLA: Statistical Consulting Group; 2016; Leedy & Omrod, 2013; Stone & Ellis, 2006).

5.4. Data presentation

Raw data and interpreted findings have been displayed via relevant SPSS graphs, tables and charts, as per 11. Appendix A: Graphs (Leedy & Omrod, 2013).

5.5. Limitations and Biases

These are examined further and more comprehensively in section 8.3. Limitations. For the purposes of this section, it is sufficient to note that a correlational study design (particularly cross-sectional) may limit internal validity, and therefore the ability to draw causational conclusions about the relationship of Facebook use to ICT engagement. The use of questionnaires may also increase the risk of self-selection and self-report biases and also undermine internal validity.

However, the identified design and methodology seem sufficient for the identification of any significant correlations that may exist between the two. The study does not aim to determine the nature of underlying causal relationships.

For a full treatment of limitations, biases and methodological issues, see section 8.3. Limitations.

5.6. Ethical considerations

5.6.1. Human Ethics

According to Victoria University's Human Ethics Policy, this correlational study requires submission for approval to the Human Ethics Committee (Victoria University of Wellington, 2016). The study however appears to meet the principles in section 4.2, including the 'Respect and care for persons' principles in section 4.2.1 (Victoria University of Wellington, 2016). Human Ethics approval has been sought and obtained for this study, granted by the Chair of Victoria University's Human Ethics Committee as of the 14th of April, 2016.

5.6.2. Privacy

As the information obtained is personal, privacy issues apply. As such, total confidentiality and anonymity have been guaranteed for all participants. To protect individual's privacy but still allow

comparison between their test instruments, completed questionnaire survey instruments have been electronically labelled with a random, anonymous code unique to the participant. Additionally, the option in Qualtrics (the host platform for survey questionnaire instrument) that enables IP address recording has been turned off. This ensures that absolutely no personally identifying information of any sort will be associated with completed survey instruments. Raw data obtained will not be stored online. In consultation with the research supervisor and Human Ethics Committee, it has been determined that Victory University's privacy guidelines have been satisfactorily applied (Victoria University of Wellington, 2016).

5.6.3 Informed Consent

For the purposes of this study, and preserving anonymity and confidentiality, participants will not receive an informed consent form beforehand. The content that would otherwise constitute the informed consent forms has instead been included in the preamble of the survey instrument: a brief description of the aims of the study, notification that participation is voluntary and what it will involve, the study's potential benefits, a guarantee of privacy, confidentiality and anonymity, contact details for the researcher, research supervisor and institution, instructions for access to a website where a summary of findings will be published once the study is completed.

Included in the preamble is a statement that voluntary participation will be taken to imply informed consent to participate. For more details, see 12. Appendix B: Survey Instrument.

5.6.4. Copyright

For the completed survey materials used to measure individual's Facebook usage, no known copyright issues exist. Available evidence suggests that the 2009 version of the PISA ICT Familiarity Questionnaire, if not the updated 2015 version, is available for free usage on the condition of source attribution (PISA, 2008; PISA, 2016).

6. Publication Venues

Due to its subject matter, publication of the research report and its findings might be particularly relevant to and thus sought in the journals *Journal of Documentation, Journal of Information Science* and the annual conference of LIANZA, the Library and Information Association of New Zealand Aotearoa.

7. Results

At the conclusion of the survey sampling period, 148 completed responses were obtained. According to Leedy and Ormond (2013), in terms of associated sample size needed for representativeness for any given population, increases in population size become almost irrelevant for any population over 5,000, and any sample in excess of 400 is more than adequate to be considered a representative sample. This means that the representativeness of sample in this case is questionable, which in turn undermines the external validity of the results.

From the 148 completed surveys, the data from the various survey questions were collated into three variables: ICT familiarity score; average duration of weekly Facebook access (minutes); average frequency of weekly Facebook access.

The range of responses for ICT familiarity was 27-298. The mean value was 170.1, the median 175, with a standard deviation of 38.88. For further detail, see figure 4 in 11. Appendix A: Graphs.

300326779

The range of responses for average duration of weekly Facebook access (minutes) was 0-2100. The mean value was 447.74, the median 368.25, with a standard deviation of 450. For further detail, see figure 5 in 11. Appendix A: Graphs.

The range of responses for average frequency of weekly Facebook access was 0-560. The mean value was 40.79, the median 28, with a standard deviation of 58.152. For further detail, see figure 6 in 11. Appendix A: Graphs.

Pearson product moment correlations were calculated for the variables. A two-tailed test was used in all instances, as the study was attempting to uncover effects in either direction and, to be consistent with the hypotheses and study objectives and make a fair test, no pre judgement was made about the possible directionality of the differences. The decision to use a two-tailed test also reduces methodological bias and increases the robustness of the correlation figures, thus serving to improve the external validity of the findings.

While the correlation between the duration of users' average weekly Facebook access and ICT engagement was not found to be significant at .063 (two-tailed), a significant (though weak) positive correlation of .279 at the 0.01 level (two-tailed) using the Pearson product moment correlation. For further detail, see figures 1, 2 and 7 in 11. Appendix A: Graphs.

To summarise, these findings support the study's hypotheses that 1) statistically significant correlations between some Facebook usages patterns and ICT familiarity would be found, and that 2) different kinds of Facebook usage patterns would have different impacts on user's ICT familiarity: as while the results did not show any evidence that users' average weekly duration of Facebook access influenced ICT familiarity, the findings did show evidence that users' average weekly frequency of Facebook access may influence ICT familiarity.

The results however do not support the study's hypothesis that 3) high duration Facebook usage would be correlated with high ICT familiarity scores, and high frequency Facebook usage with low ICT familiarity scores: the results indicated almost the opposite, with high frequency usage associated with ICT familiarity scores and no significant correlation between duration of Facebook usage, high or low, and ICT familiarity scores.

The data therefore suggests that how much time users spend on Facebook per week does not influence ICT familiarity, but how often users access Facebook per week may indeed influence ICT familiarity. Being a correlation study however, it is not clear if there are any causational links, or what direction causation even lies in. It is interesting though to note that the variables do indeed appear positively associated, albeit with a relatively weak correlation.

Facebook access frequency and Facebook access duration were also similarly significantly positively correlated, though only weakly, at .299 (two-tailed). For further detail, see figures 3 and 7 in 11. Appendix A: Graphs.

These results suggest that while users' frequency of Facebook access and duration of access patterns do influence one another, there is a wide range of effect of this influence. This seems to indicate that users' Facebook access patterns can be quite varied and heterogeneous, at least so far as the combinations of duration and frequency of access are concerned.

300326779

8. Discussion

There are a number of conclusions and implications that can be drawn from this cross-sectional correlational study. Most significant is that the frequency with which individuals access Facebook appears positively correlated with their ICT familiarity scores, and thus their ICT engagement. This has implications for government policy and the professional practice of librarians and other information professionals, as the way regular and frequent Facebook access is facilitated or not, particularly for at-risk individuals and groups with limited ICT access, may according to the results of this study influence their broad social outcomes.

It's also interesting to note the heterogeneous and diverse usage patterns of Facebook implicated by the results. This suggests there may be value in future studies breaking down general social media use and access patterns even further, given the implications for broadly different and specific impacts on ICT engagement. It may be possible to fine tune policies and programmes to offer more effective and fiscally prudent targeting of ICT engagement amongst at-risk and low ICT access groups and individuals.

8.1. Study Design

The purpose of this study was to build on existing conceptual frameworks and models in order to integrate with the contemporary body of relevant literature in this area, and to further it by directly examining the relationship of Facebook access to ICT engagement, addressing this existing gap in the relevant literature.

As discussed in the literature review, existing research into ICT use, social media use and educational outcomes tends to utilise a range of research-backed concepts (where demonstrably useful), rather than formal theory. There are existing studies in this area that have also selected the PISA Questionnaires as an instrument with good reliability and validity for assessing ICT engagement and other educational measures (Biagi & Loi, 2013; Spiezia, 2010). The related research, as a whole, appears to typically use such questionnaire instruments combined with a cross-sectional design (Biagi & Loi, 2013; Karpinski et al., 2013; Juno & Cotten, 2012; Pasek & Hargittai, 2009; Jarnieson-Proctor et al., 2007).

This study and its findings supports the validity of these existing conceptual approaches, and has utilised and furthered them in successfully identifying a statistically significant correlation in this area previously not investigated, Facebook access and ICT engagement.

8.2. Findings

It was hypothesised that statistically significant correlations between some Facebook usage patterns and ICT engagement outcomes would be found.

This appeared to be confirmed by the results, and suggests it may be worthwhile for governments and information professionals to amend and update their policy and professional practice, respectively, to positively influence people's ICT engagement and thus socioeconomic outcomes. Some methodological issues however, to be discussed further below, suggest the external validity of this study's results may be questionable.

Based on the review of the relevant literature, it was hypothesised the data would show different Facebook usage patterns to be correlated with different ICT engagement outcomes; that certain patterns of usage might improve engagement, others worsen it, and others have no significant impact.

This seems to have been confirmed in part, in that average Facebook frequency was positively correlated significantly but weakly with ICT familiarity scores, while average duration had no determined correlation. This suggests there may be value in policy and professional practice that targets people's frequency of access; that through improvement of access to a range of devices at locations throughout their daily routines, such programmes may make a valuable contribution to ICT engagement. By contrast, measures taken to increase the time people spend on Facebook may have no significant impact, and cannot be recommended on the basis of this study's findings. There are some methodological issues however, again to be discussed further below, which may undermine the reliability of the survey instruments items, again impacting on the external validity of these findings.

It was hypothesised that high duration Facebook usage would be correlated with good ICT engagement outcomes; high frequency with poor outcomes.

This was not confirmed by the results of this study.

8.3. Limitations

This study offers some potentially important results, statistically significant correlations that contribute new insights and perspectives to the literature around social media and its impact on ICT engagement. However, there are key limitations to the study, as well as some methodological issues that call into question the reliability and external validity of the results found.

Overall though, the identified design and methodology appears adequate for the stated aim of identification of any significant correlations that may exist between the Facebook access patterns and ICT familiarity scores. This study has not aimed nor attempted to determine the direction or strength of any underlying causal relationships. Additionally, the finding that two statistically significant correlations can be taken from the data counts as evidence that reasonable reliability and validity remain despite the study's limitations.

The study's identified limitations and methodological issues are as follows:

8.3.1. Cross-sectional design

Perhaps the most significant limitation of correlation studies is the difficulty in identifying causation, let alone which way it might lie if it was indeed present. This correlation study used a cross-sectional design as opposed to longitudinal, for feasibility reasons. Longitudinal data however might have proved more useful in determining possible causality, as it might for example indicate how changes in Facebook frequency or duration tended to be followed by changes in ICT familiarity, or not. Longitudinal data would also be useful in establishing levels of internal consistency with participants' estimations, and thus ostensibly help develop better reliability.

8.3.2. Sample

The specific number of online New Zealanders today is hard to determine precisely.

This is in part because available data is primarily based on: 1) the total number of national dial-up and broadband internet connections, which is less than the probable total number of users (as there are multiple users per household/business connection); and 2), the number of mobile phone-based internet connections, which is more than the probable total number of users (as there are many users who own multiple devices) (Statistics New Zealand, 2015a).

The discrepancy between these two figures is sizeable: 1,980,000 for dial-up and broadband, vs. 3, 959,000 for mobile (Statistics New Zealand, 2015b). This does not narrow down much the probable

figure for the total number of online New Zealanders. Statistics New Zealand's NZ Official Yearbook 2012 puts the official estimate of online New Zealanders in 2012 at 2.8 million; unfortunately the 2015 yearbook appears somewhat overdue for release (Statistics New Zealand, 2016; Statistics New Zealand, 2012).

For any population over 5,000, increases in population size become almost irrelevant, and a sample size in excess of 400 is considered adequate to achieve valid representativeness, so far as proportionate size is concerned at any rate (Leedy & Ormond, 2013). In this study, however, only 148 completed surveys of the 400+ target were obtained. If we use the figure of 2.8 million from Statistics New Zealand's (2012) most recent official yearbook data, this constitutes about .00005% of online New Zealanders. This is a methodological limitation which undermines the representativeness of the sample, and thus the external validity of the findings; although, the finding of two statistically significant correlations suggests the validity may not be wholly compromised.

Another significant issue with the sample is the question of just how random the random selection process was. To maximise representativeness and minimise sampling bias, links to the prospective surveys online were distributed amongst public libraries across New Zealand and offered to the general public. Public libraries are typically patronised by a diverse range of users representative of their broader communities, and have advantageous and comparatively extensive 'reach' into society (Lianza, 2016; Auckland Libraries Business Plan 2013-14, 2014; Goulding, 2013). However, individuals without good transport options, or who otherwise perceive barriers to accessing their local libraries, would be less likely to participate in the survey; it is quite possible that these individuals as a group would tend to have lower ICT familiarity scores and/or frequency of Facebook access (Crothers et al, 2016; Morrell, 2011; Mestre, 2010; Warschauer, 2010; Peters, 2006)

As the survey instrument was completely anonymous and confidential, there is also no way to assess the demographics of the participants, and determine how this might contribute to or undermine representativeness.

It's also worth noting though that in requiring participants to complete an online survey, the sampling process is likely biased against participants with low ICT familiarity, who may find the prospect of completing an online survey too confusing or else simply too daunting. As such, another limitation is the fact that the survey was only accessible to people able to access the online survey; individuals unable to readily access the internet, due to ability or resources, would not be able to complete the survey.

8.3.3. Self-report bias
Data that is self-reported may be biased by issues such as inaccurate memory, inaccurate assessment and calculation of traits in response to questionnaire items, as well as general subjectivity of perception.

A more accurate design might involve objective tests and measurement techniques to assess individual's Facebook access frequency, duration, and ICT familiarity directly. Such a design was judged to be too costly and time consuming to be feasible for implementation in this study, however.

8.3.4. Self-selection bias
Self-selection bias is another caveat here, as it's possible that sort of library patrons that are willing and able to participate in an online survey are not representative of all online New Zealanders; they may as a group tend to have higher than average ICT familiarity scores and hence be more confident

willing to participate in such surveys, or alternatively perhaps lower than average scores, and seek out such surveys to improve their understanding.

For the sake of conjecture, it's also hypothetically possible that the types of individuals who tend to seek out online surveys may enjoy taking surveys for the sake of taking them, rather than focusing on accuracy, or may even take surveys to boost their perceptions of themselves, and thus be inclined to exaggerate or diminish certain perceived traits as they answer.

These aspects of the sample selection affect the integrity of the random selection process, and therefore the probable representativeness of the sample of 148 and, in turn, the external validity of the study's findings.

8.3.5. Survey instrument

The construction of prospective questionnaire items needed to assess the first and second variables (average duration of weekly Facebook access in minutes, and average frequency of weekly Facebook access) were examined and considered to be more or less straight forward, and it appeared appropriate to develop them specifically for this study.

In order to assess the internal consistency of participant's responses and accuracy, and thus improve the instrument's reliability, in item 1 of the survey instrument participants were asked to estimate how frequently they accessed Facebook both daily and weekly.

If participants' responses had high internal consistency and accuracy, there ought to be no discrepancy between these figures. In such cases no manipulation was performed on that aspect of the raw data set for that respondent.

If there was either a minor discrepancy or no discrepancy between these two figures, they were then averaged to provide a single figure for the average frequency of weekly Facebook access variable.

If there was a major discrepancy between these two figures, the full set of responses for that participant was discarded. This process was one measure taken to improve the survey's reliability.

Item 2 of the survey instrument, asking participants to estimate how much time they spent on Facebook, was similarly designed to assess consistency and accuracy of responses, again to improve reliability.

This way done in two ways. The first, as with item 1 above, was to ask participants to estimate duration for both daily and weekly access, and compare discrepancy between the figures. A process of average low discrepancies and discarding high was again used to maximise reliability.

The second method concerned the inclusion of duration measurement in minutes and / or hours, as pre-release trials with different permutations of item 2 indicated that some participants' estimations showed major discrepancies when asked to estimate in only hours, or only minutes. Trials indicated that allowing an and / or option with hours and minutes appeared to significantly reduce discrepancies in participants' estimations, thus improving the item's internal reliability. It also provided a larger set of estimated duration data per participant, allowing more accurate assessment of discrepancy and more accurate averaged figures for the duration variable, again affording higher reliability.

By utilising multiple items and strategies for obtaining these variables, the reliability of the survey instruments ought to be improved, or at least as pertains to these two variables. It is possible that the findings of weak (though significant) positive correlations in two instances, and no correlation in

the third, is an indicator that the survey instrument's reliability was not high. On the other hand, the finding of any statistically significant correlation at all does suggest some degree of reliability.

Due to feasibility issues, the survey instrument used in this study was not subject to robust testing of its reliability. Ideally, if this study was replicated, part of that replication would involve more comprehensive testing of the survey instrument's reliability.

For the third variable, ICT familiarity, the PISA ICT familiarity questionnaire was identified as the ideal measurement instrument. The scope and approach of the items appeared an excellent fit for the measurement of ICT familiarity amongst online New Zealanders aged 16 and over—perhaps unsurprisingly, given the international body behind its development and construction—and naturally there are clear benefits to using a tried and tested instrument and harnessing the validity already established via years of research and resources (Crothers et al, 2016; PISA, 2016; Biagi & Loi, 2013; Spiezia, 2010; PISA, 2008).

However, as the full updated 2015 version appears to be at this stage not available (or at least without prohibitively high commercial investment), it was necessary for the purposes of this study to rely on the 2009 framework and update where necessary (and plausible) with insights from the PISA 2015 Draft Questionnaire Framework (2016), the 2015 Internet in New Zealand report and data from Statistics New Zealand and Lianza's 2016 facts and figures report (Crothers et al, 2016; Lianza, 2016; PISA, 2016) .

This action however significantly limits the validity of this component of the questionnaire instrument, and thus the data collected for the ICT familiarity variable and the validity of the finding of a significant (though weak) correlation with Facebook access frequency patterns.

Again, it is possible that the findings of weak or no correlations is due to the survey instrument having low reliability. While the PISA ICT familiarity questionnaire itself is known to possess good reliability, it's not difficult to see how the aforementioned issue with restricted access to the 2015 version, and subsequent need to update and modify the older version, could significantly affect reliability.

8.4. Implications and Future research

The implications are significant if the findings in this study, once reliability and validity issues are accounted for, are indeed accurate.

Due to some of the methodological limitations of this study, as discussed above, it is difficult to determine whether the weak correlations found are due to compromised reliability in the items designed to measure one or more of the variables, undermined validity for the reasons discussed above, the combined effect of reduced reliability and validity, or simply the relationship between the variables itself being weaker than hypothesised. Although, the finding of statistically significant correlations can be taken as fair evidence for reasonable levels of reliability and validity.

On full examination of the methodological limitations, it seems that while several methodological features were introduced that improved the validity and especially reliability (as discussed above) of the findings, it remains probable that overall the reliability and validity issues have compromised the results to some extent.

If further studies were able to replicate the results of this study, this would boost the external validity of the findings and make a more compelling case for the implications concerning

governments' and information professionals' policy and professional practice (in regard to facilitating at-risk and low ICT access groups and individuals' frequency of access to Facebook). Additionally, would also be worthwhile for future studies to investigate the different impacts of other forms of social media and similar platforms on ICT engagement.

Future replications of this study could also potentially return stronger and more compelling correlative effects, if the methodological limitations of this study outlined above were addressed. In particular it would be advantageous for longitudinal studies to be conducted in this area, as they could potentially improve internal reliability and generate more grounds to being to establish causality in the results than the cross-sectional research that has dominated this area.

Of course even more advantageous would be a true experimental design, with participants randomly assigned to groups that restricted and mandated their Facebook access in terms of frequency and duration, and observe the subsequent differences between within group and between group variations in ICT familiarity scores.

Also useful would be the design and implementation of objective, external assessment tools that directly measure participants Facebook usage patterns and ICT familiarity without the mediation of self-report and reliance on participants own perceptions, assessment and memory.

The results of future research conducted in this area, addressing this study's limitations and incorporating the above recommendations, could add significant impetus to the implications of the findings of this study.

9. Conclusion

There are several conclusions that can be drawn from this study.

First is that Facebook usage may indeed impact, albeit if only indirectly via its influence on ICT engagement, on digital divide issues and broad socioeconomic outcomes. Given the importance of ICT engagement and familiarity to ostensibly worsening digital divide issues and socioeconomic inequities, as established above, the finding of a significant positive correlation between the weekly average frequency of participants Facebook access and their ICT familiarity scores constitutes reasonable evidence for its probable indirect socioeconomic influence.

That the correlation was weak is not grounds for dismissing this effect; rather, it is good justification for further and more extensive research in this area to seek replicate these findings, ideally addressing the limitations and methodological issues as identified above. Preferably future research would also utilise longitudinal or even experimental designs, in order to better identify and establish any causational effects. It seems reasonable to state that it is possible that a replication of this study, addressing the reliability and validity issues as discussed above, could indeed potentially return stronger correlative effects. How probable this is, though, is unable to be demonstrated with the study's available data and limitations.

Based on the finding of this significant (though weak) positive correlation, it appears possible that facilitating users' frequent access to Facebook (and perhaps, speculatively at this stage, across a variety of devices e.g. desktop computer, laptop, pad or tablet, smartphone etc) could have a significant positive impact on overall ICT engagement (Crothers et al, 2016; Statistics New Zealand, 2015b). While the review of literature has shown that in general, a focus on hardware access qua hardware access over information literacy skills may be detrimental to academic educational outcomes, this is not necessarily the case for hardware access that serves the direct and specific

purpose of facilitating frequent Facebook access. It is important to draw a distinction between arbitrary and purposeful hardware access.

Due to digital divide issues, and the possible relationship between ICT engagement and broad social outcomes, this may raise issues of governmental and information professional obligation to work deliberately to facilitate said access, particularly for individuals and groups characterised by low SES or ICT access. This might include funding and educational workshops directed at assisting and advocating Facebook access, across a broader range of contexts and devices throughout individuals' daily activities.

Secondly, the study has similarly demonstrated a weak but significant positive correlation between the two Facebook usage pattern variables; average weekly duration and average weekly frequency. Inasmuch as the methodological limitations allow conclusions, this suggests that while there is a likely relationship between these variables, it is not a simple direct relationship.

These findings provide further evidence for the proposition that different Facebook usage patterns' have different impacts on ICT familiarity, again supporting the notion that the when and how of use of Facebook is important, and that this variety and heterogeneity of usage patterns implies that attempts to improve users' frequency of access to Facebook ought to be fairly agile and user-feedback responsive.

It would also be valuable here for future research to identify and isolate the effects of potential moderating and mediating valuables, to get a more comprehensive picture of the relationships between Facebook usage patterns and ICT engagement. It additionally would be advantageous to then extend these studies to examine the effects of the same kinds of variables in relation to other forms of social media, and similar platforms, on ICT engagement, particularly as other platforms approach levels of ubiquity similar to Facebook's current pervasive status.

Thirdly, the study failed to find any significant correlation, positive or negative, between average weekly Facebook duration and ICT familiarity. It is possible that this lack of correlation is due to the previously discussed methodological issues and limitations; it's also possible that it is due to the hypothetical low reliability of the modified survey instrument used to obtain the data.

If this finding is valid however, it has important implications for any policy or professional practice implications. The lack of correlation suggests that firstly, no real ICT familiarity benefit would obtained from improving the amount of time people had access to Facebook, and action taken to ensure at-risk or low ICT familiarity individuals' and groups' Facebook access would be more effectively utilised in promoting and facilitating consistency and frequency of access. Secondly, it implies that time spent on Facebook is not detrimental in any way to ICT engagement. Concerns raised in previous research about time spent on social media may perhaps be allayed, though further research and replication of these findings is recommended here.

As a cross-sectional correlational study, again an important caveat when considering these conclusions is that the direction of causation, if any causation indeed exists, is unclear. Due to methodological limitations, as discussed in this report, further, more methodologically robust research and replication of these results is advised before considering implications of this research on digital divide issues and broad socioeconomic outcomes, and the subsequent recommendations for updates to information professionals' practice or governmental policy in these areas.

10. References

Ahn, J. (2011). The effect of social network sites on adolescents' social and academic development: Current theories and controversies. *Journal Of The American Society For Information Science & Technology, 62*(8), 1435-1445

Auckland Libraries Business Plan 2013-14. (2014). Retrieved March 7, 2016, from: http://www.aucklandlibraries.govt.nz/EN/About/plansandpolicies/businessplan/Documents/businessplan2013noappendices.pdf

Backer, E. (2010). Using smartphones and Facebook in a major assessment: the student experience. *E-Journal Of Business Education & Scholarship Of Teaching, 4*(1), 19-31

Biagi, F., & Loi, M. (2013). Measuring ICT Use and Learning Outcomes: evidence from recent econometric studies. *European Journal Of Education, 48*(1), 28-42.

Blanchard, M., Metcalf, A., Degney, J., Herrman, H., & Burns, J. (2008). Rethinking the digital divide. *Youth Studies Australia, 27*(4), 36-42.

Carlson, J. R., Zivnuska, S., Harris, R. B., Harris, K. J., & Carlson, D. S. (2016). Social Media Use in the Workplace: A Study of Dual Effects. *Journal of Organizational and End User Computing (JOEUC), 28*(1), 15-31.

Chun, M., Golomb, J., & Turk-Browne, N. (2011). A taxonomy of external and internal attention. *Annual review of psychology*, *62*, 73-101.

Crothers, C., Smith, P., Urale, P., & Bell, A., (2016). *The Internet in New Zealand 2015*. Auckland: the Institute of Culture, Discourse and Communication, AUT University. Retrieved March 6, 2016, from: http://www.aut.ac.nz/__data/assets/pdf_file/0008/635669/150416-Online-Version-WIPNZ-2015-April-15.pdf

300326779

De Koster, S. (2012). Concept-guided development of ICT use in 'traditional' and 'innovative' primary schools: what types of ICT use do schools develop?. *Journal Of Computer Assisted Learning, 28*(5), 454-464.

Duggan, M., & Smith, A. (2013). Social media update 2013. Pew Internet and American Life Project. Retrieved March 6, 2016, from:

http://www.pewinternet.org/2013/12/30/social-media-update-2013/

Fu, J.S. (2013). ICT in Education: A Critical Literature Review and Its Implications. *International Journal Of Education & Development Using Information & Communication Technology, 9*(1), 112-125.

Gibson, A., Miller, M., Smith, P., Bell, A., & Crothers, C. (2013). The Internet in New Zealand 2013. Auckland: the Institute of Culture, Discourse and Communication, AUT University. Retrieved March 6, 2016, from:

http://media.nzherald.co.nz/webcontent/document/pdf/201347/nzworldinternet.pdf

Goulding, A. (2013). The Big Society and English public libraries: where are we now? *New Library World, 114*(11/12), 478-493.

Halewood, N., & Kenny, C. (2008). Young people and ICTs in developing countries. *Information Technology for Development*, *14*(2), 171-178.

Hilbert, M. (2016). The bad news is that the digital access divide is here to stay: Domestically installed bandwidths among 172 countries for 1986–2014. *Telecommunications Policy*.

Itō, M. (2010). *Hanging out, messing around, and geeking out: Kids living and learning with new media.* Cambridge, Mass: MIT Press.

300326779

Ivan, L., & Frunzaru, V. (2014). The Use of ICT in Students' Learning Activities. *Journal Of Media Research, 7*(1/2), 3-15.

Jarnieson-Proctor, R., Watson, G., Finger, G., Grimbeek, P., & Burnett, P. (2007). Measuring the Use of Information and Communication Technologies (ICTs) in the Classroom. *Computers In The Schools, 24*(1/2), 167-184.

Junco, R., & Cotten, S. (2012). No A 4 U: The relationship between multitasking and academic performance. *Computers & Education, 59*(2), 505-514.

Karpinski, A, & Duberstein, A. (2009). A description of Facebook use and academic performance among undergraduate and graduate students. In *Annual Meeting of the American Educational Research Association, San Diego, CA* (pp. 5-10).

Karpinski, A., Kirschner, P., Ozer, I., Mellott, J., & Ochwo, P. (2013). An exploration of social networking site use, multitasking, and academic performance among United States and European university students. *Computers In Human Behavior, 29*(3), 1182-1192.

Kirschner, P., & Karpinski, A. (2010). Facebook® and academic performance. *Computers in human behavior*, *26*(6), 1237-1245.

Kitsantas, T., Chirinos, D. S., Hiller, S. E., & Kitsantas, A. (2016). An Examination of Greek College Students' Perceptions of Positive and Negative Effects of Social Networking Use. In *Social Networking and Education* (pp. 129-143). Springer International Publishing.

Kent State University. (2016). *Pearson Correlation – SPSS Tutorials*. Retrieved May 12, 2016, from: http://libguides.library.kent.edu/SPSS/PearsonCorr

Laerd Statistics. (2016). *Pearson's Product-Moment Correlation in SPSS Statistics – procedure, assumptions, and output using a relevant example.* Retrieved May 12, 2016, from:

300326779

https://statistics.laerd.com/spss-tutorials/pearsons-product-moment-correlation-using-spss-statistics.php

Leedy, P., & Omrod, J. (2013). *Practical Research: planning and design.* (Tenth ed.). Boston, MA:

Pearson Education

LIANZA. (2016). *Facts & Figures*. Retrieved March 7, 2016, from:

http://www.lianza.org.nz/profession/facts-figures

Mestre, L.S. (2010). Librarians Working with Diverse Populations: What Impact Does Cultural

competency Training Have on Their Efforts? *Journal of Academic Librarianship*, *36*(6), 479–

488.

Morrell, E. (2011). Critical approaches to media in urban English language arts teacher

development. *Action in Teacher Education, 33*(2), 151-171.

National Forum on Information Literacy. (2015). *What is the NFIL?* Retrieved March 6, 2016, from:

http://infolit.org/about-the-nfil/what-is-the-nfil/

Naslund, J. A., Aschbrenner, K. A., Marsch, L. A., & Bartels, S. J. (2016). The future of mental health

care: peer-to-peer support and social media. *Epidemiology and psychiatric sciences*, 1-10.

Nielsen. (2015). *Study of Kiwis aged 18+ on Facebook.* Retrieved March 8, 2016, from:

https://fbcdn-dragon-a.akamaihd.net/hphotos-ak-xat1/t39.2365-6/11404884_479689595533265_1705163377_n.pdf

Pasek, J., & Hargittai, E. (2009). Facebook and academic performance: Reconciling a media

sensation with data. *First Monday*, *14*(5).

Peters, Sonya. (2006). Te Ara Tika Ki Manukau: Staying The Distance - 2006 And Beyond…. Presented

at the Lianza Conference 2006. Retrieved March 4, 2016, from

http://www.lianza.org.nz/sites/lianza.org.nz/files/tearatikakimanukau_speters.pdf

PISA. (2008). *ICT Questionnaire – PISA 2009*. Retrieved March 6, 2016, from:

https://pisa2009.acer.edu.au/downloads/PISA09_ICT_questionnaire.pdf

PISA. (2016). *PISA 2015 Draft Questionnaire Framework*. Retrieved March 6, 2016, from:

http://www.oecd.org/callsfortenders/Annex%20IE_PISA-2015-draft-questionnaire-
framework.pdf

Proctor, R., Watson, G., & Finger, G. (2003). Measuring information and communication

technology (ICT) curriculum integration. *Computers in the Schools*, *20*(4), 67-87.

Rouis, S., Limayem, M., & Salehi-Sangari, E. (2015). Social Media and Students' Achievement: The

Role of Culture and Personality. In *The Sustainable Global Marketplace* (pp. 148-152).

Springer International Publishing.

Saha, N., & Karpinski, A. C. (2016). The Influence of Social Media on International Students' Global

Life Satisfaction and Academic Performance. *Campus Support Services, Programs, and

Policies for International Students*, 57.

Sang, G., Valcke, M., van Braak, J., Tondeur, J., & Chang, Z. (2011). Predicting ICT integration into

classroom teaching in Chinese primary schools: exploring the complex interplay of teacher-

related variables*. Journal Of Computer Assisted Learning, 27(*2), 160-172

Shear, L., Koh, R., Patel, D., Trinidad, G., Chen Kee, T., & Png, S. (2014). ICT and Instructional

Innovation: The Case of Crescent Girls' School in Singapore. *International Journal Of

Education & Development Using Information & Communication Technology, 10*(2), 77-88

Song, K.S., S., Hye-Sook, Kim, H.S., Seo, J., & Kim, C. (2013). Development and pilot test of ICT in

education readiness indicators in the global context. *KEDI Journal Of Educational Policy,*
10(2), 243-265.

Song, H.D., & Kang, T. (2012). Evaluating the impacts of ICT use: a multi-level
analysis with hierarchical linear modeling. *Turkish Online Journal Of Educational*
Technology, 11(4), 132-140.

Spiezia, V. (2010). Does computer use increase educational achievements? Student-level Evidence
from PISA. *OECD Journal: Economic Studies*, *2010*(1), 1-22.

Statistics New Zealand. (2012). *New Zealanders' Connection with the internet.*
Retrieved May 12, 2016, from:
http://www.stats.govt.nz/browse_for_stats/snapshots-of-nz/yearbook/society/technology/connection.aspx

Statistics New Zealand. (2015a). *Internet Service Provider Survey: 2015.*
Retrieved May 12, 2016, from:
http://www.stats.govt.nz/~/media/Statistics/Browse%20for%20stats/ISPSurvey/HOTP2015/ISPSurvey2015HOTP.pdf

Statistics New Zealand. (2015b). *Internet Service Provider Survey 2015: Tables.*
Retrieved May 12, 2016, from:
http://www.stats.govt.nz/~/media/Statistics/browse-categories/industry-sectors/information-technology-communications/ISP-survey/isp15-alltables.xlsx

Statistics New Zealand. (2016). *Yearbook collection: 1893-2012.*
Retrieved May 12, 2016, from:
http://www.stats.govt.nz/yearbooks

Stone, D. & Ellis, J. (2006). 1- vs. 2-Tailed Tests. Retrieved May 12, 2016, from:
http://www.chem.utoronto.ca/coursenotes/analsci/stats/12tailed.html

Taras, V., Kirkman, B., & Steel, P. (2010). Examining the impact of 'Culture's consequences': A

three-decade, multilevel, meta-analytic review of Hofstede's cultural value

dimensions. *Journal of Applied Psychology*, *95*(3), 405.

Techopedia. (2016a). *What is Digital Divide?* Retrieved March 6, 2016, from:

http://www.techopedia.com/definition/605/digital-divide

Techopedia. (2016b). *What is Information and Communication Technology (ICT)?*

Retrieved March 6, 2016, from:

http://www.techopedia.com/definition/24152/information-and-communications-
technology-ict

Tess, P. A. (2013). The role of social media in higher education classes (real and virtual)–A literature

review. Computers in Human Behavior, 29(5), A60-A68.

UCLA: Statistical Consulting Group. (2016). *FAQ: What are the differences between one-tailed and*

two-tailed tests? Retrieved May 12, 2016, from:

http://www.ats.ucla.edu/stat/mult_pkg/faq/general/tail_tests.htm

Victoria University of Wellington. (2016). *Human Ethics Policy*. Retrieved March 7, 2016, from:

http://www.victoria.ac.nz/law/pdf/human-ethics-policy.pdf

Warschauer, M. (2010). Digital Divide. In *Encyclopedia of Library and Information Sciences* (3rd ed.,

pp. 1551–1556). London: Taylor and Francis.

Wastiau, P., Blamire, R., Kearney, C., Quittre, V., Van de Gaer, E., & Monseur, C. (2013). The Use of

ICT in Education: a survey of schools in Europe. *European Journal Of Education, 48*(1), 11-27

Wesleyan University. (2016). *Information Literacy Defined, Library*. Retrieved March 6, 2016,

from: http://www.wesleyan.edu/libr/infoforyou/infolitdefined.html

300326779
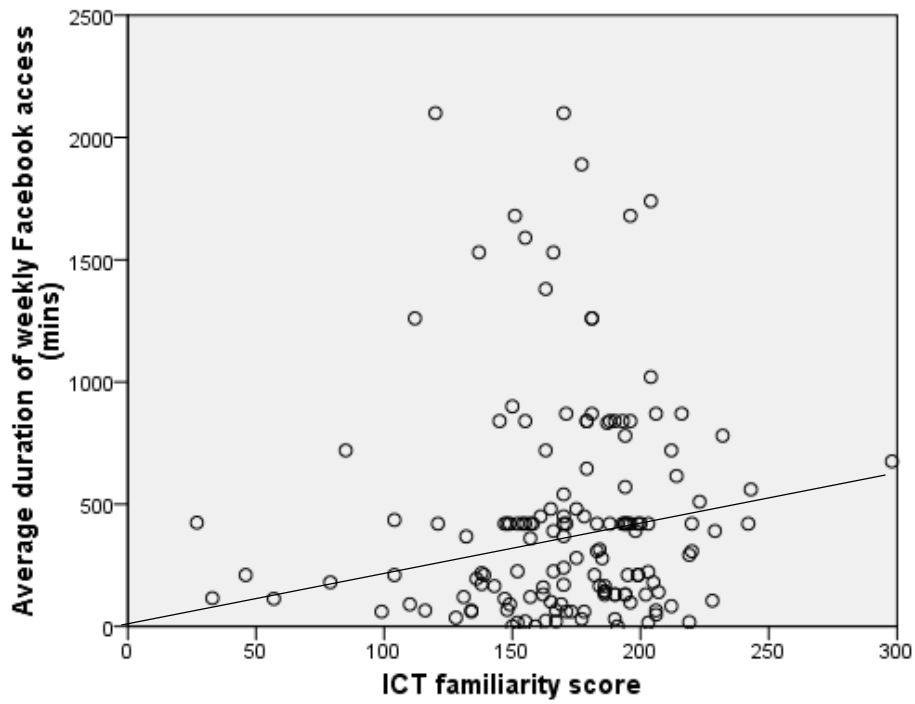
Figure 1. ICT familiarity score vs. average duration of weekly Facebook access in minutes
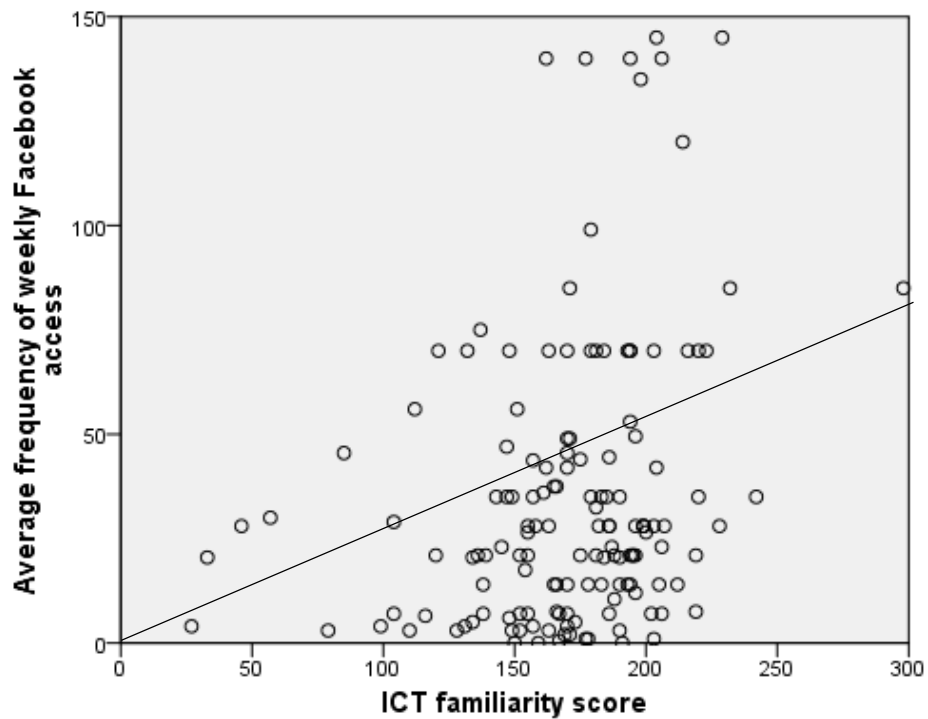
Figure 2. ICT familiarity score vs. average frequency of weekly Facebook access

300326779
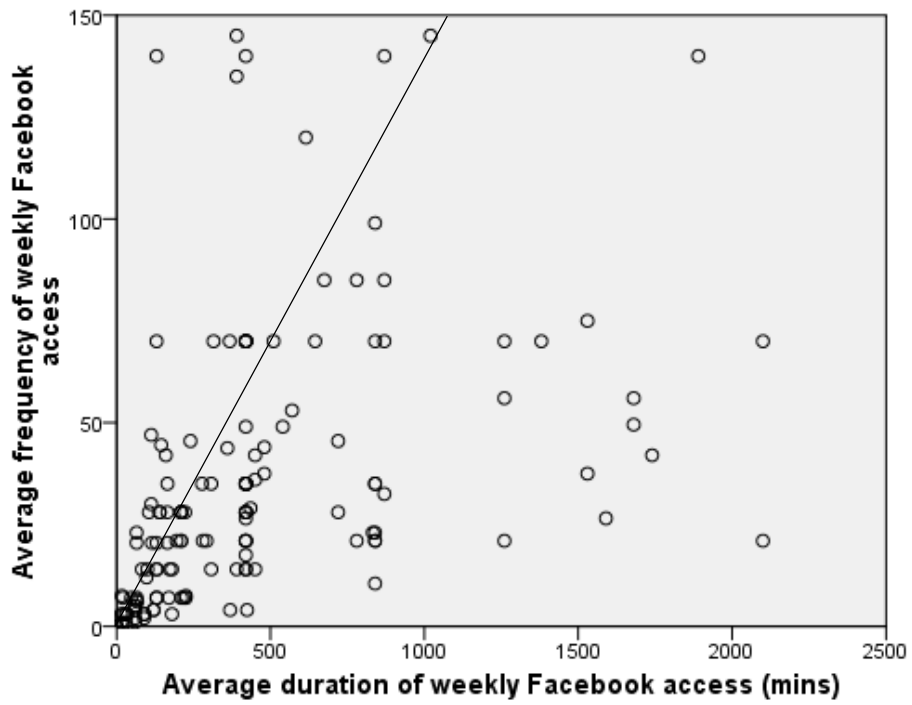
Figure 3. Average duration of weekly Facebook access in minutes vs. average frequency of weekly Facebook access
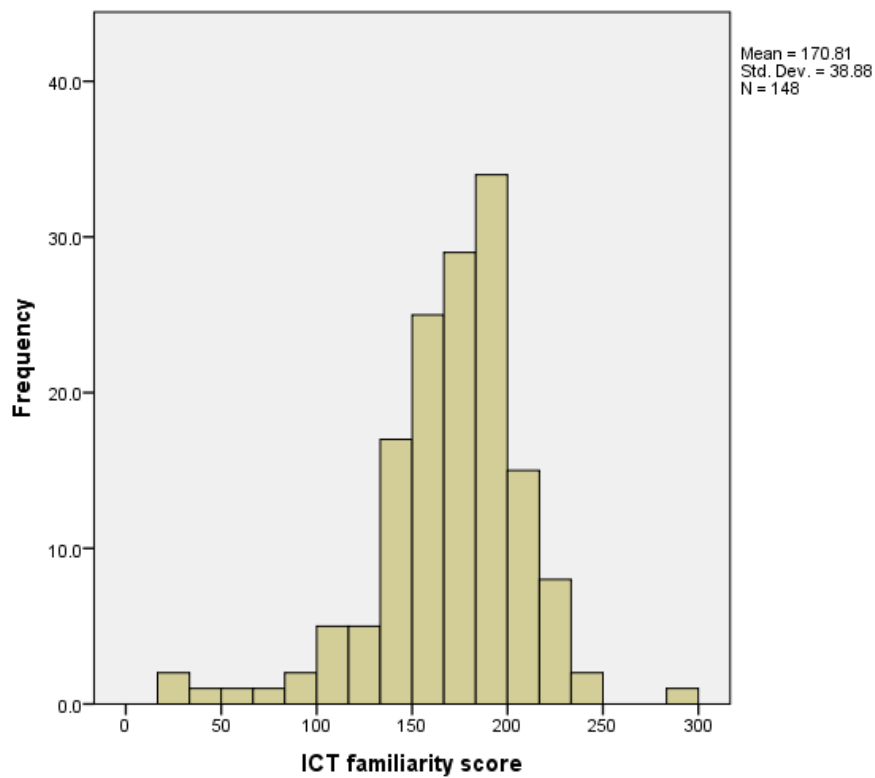

Figure 4. Distribution of ICT familiarity scores
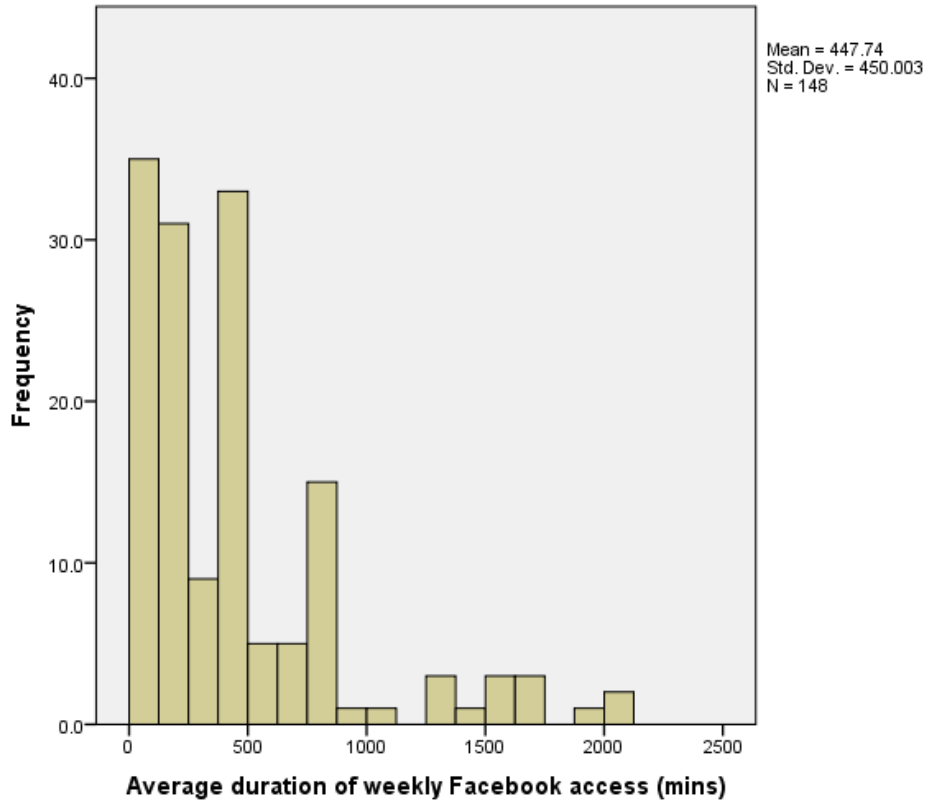
Figure 5. Distribution of average duration of weekly Facebook access
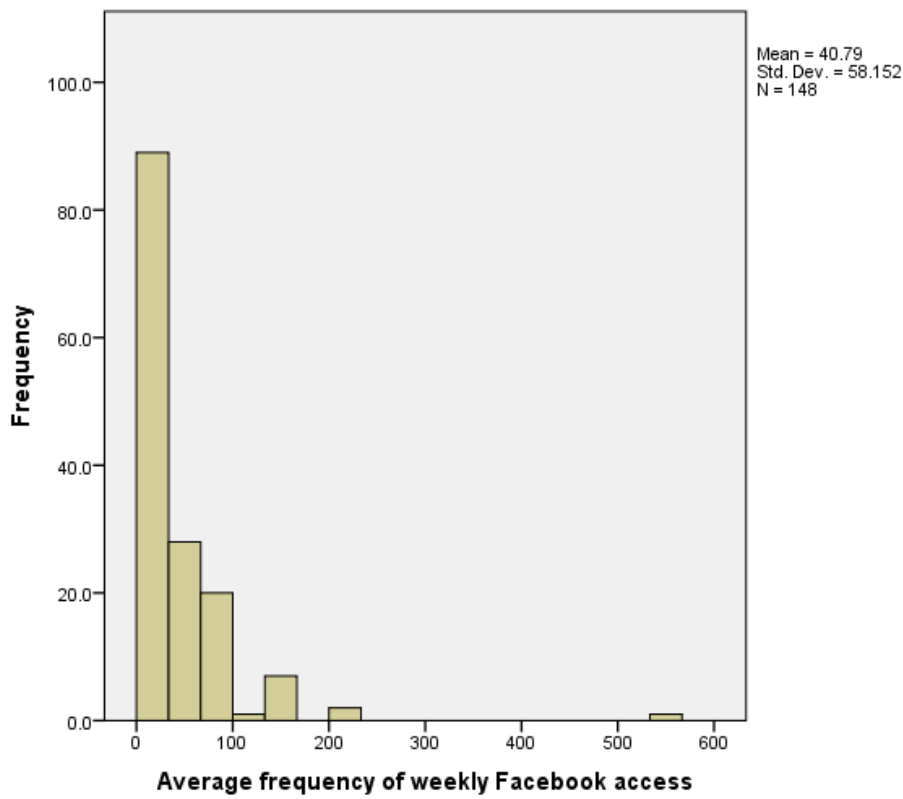
Figure 6. Distribution of average frequency of weekly Facebook access

Correlations		FBF(PW)	ICT	FBD(PW)
FBF	Pearson Correlation	1	.279**	.299**
	Sig. (2-tailed)		0.001	0.000
	N	148	148	148
ICT	Pearson Correlation	.279**	1	0.063
	Sig. (2-tailed)	0.001		0.447
	N	148	148	148
FBD	Pearson Correlation	.299**	0.063	1
	Sig. (2-tailed)	0.000	0.447	
	N	148	148	148
**. Correlation is significant at the 0.01 level (2-tailed).				

Figure 7. Pearson product moment correlations between ICT familiarity (ICT), average frequency of weekly Facebook access (FBF), and average duration of weekly Facebook access (FBD)

12. Appendix B: Survey Instrument

Do Facebook® usage patterns influence individuals' ICT engagement?

This study is designed to assess the potential links between individuals' Facebook usage and their overall familiarity with information and communication technologies*. Victoria University requires, and has granted, approval from the School's Human Ethics Committee.

Total anonymity and privacy of all participants is guaranteed. Participation is voluntary, and you will not be identified personally in any written report produced as a result of this research, including possible publication in academic conferences and journals. This survey is intended for participants aged 16 years and over.

Completion of this survey instrument will be taken as consent to participate.

All material collected will be kept confidential, and will be viewed only by myself and my supervisor, Professor Philip Calvert. The research report will be submitted for marking to the School of Information Management, and subsequently deposited in the University Library. All data collected from participants will be destroyed within 2 years of the completion of the project.

In some cases it may be difficult to give an exact answer to a question. In these instances, please answer questions to the best of your knowledge.

*Technologies, both software and hardware, used in telecommunications, broadcast media, audiovisual processing and transmission systems. Typically experienced by end-users via manifestations like smart devices, desktops/laptops, pads, cellphones, operating systems, apps and similar

Facebook® access frequency
Roughly how often do you access Facebook®?

Per day	☐
Per week	☐

Facebook® access duration
Roughly how much time do you spend on Facebook®?

Hours per day and/or...	☐
...Minutes per day	☐
Hours per week and/or...	☐
...Minutes per week	☐

300326779

Definition of Information and Communication Technology (ICT):

Technology used in telecommunications, broadcast media, audiovisual processing and transmission systems.

Typically experienced by users through forms like smart devices, desktops/laptops, pads, cellphones, operating systems, apps and similar.

Information and Communication Technology (ICT) access at home

Please indicate whether you use the following at home and how often.

	Daily	About 3 - 5 times a week	About 3 - 4 times a month	Seldom	Never
Internet	O	O	O	O	O
Desktop computer	O	O	O	O	O
Laptop, notebook or netbook	O	O	O	O	O
Pad or tablet device	O	O	O	O	O
Videogames console such as Xbox®, Playstation®	O	O	O	O	O
Smartphone	O	O	O	O	O
Other cellphone	O	O	O	O	O
Printers or scanners	O	O	O	O	O
Mp3 or other portable music device	O	O	O	O	O
Portable USB memory devices	O	O	O	O	O

300326779

Definition of Information and Communication Technology (ICT):

Technology used in telecommunications, broadcast media, audiovisual processing and transmission systems.

Typically experienced by users through forms like smart devices, desktops/laptops, pads, cellphones, operating systems, apps and similar.

ICT access outside the home*

Please indicate whether you use the following outside the home and how often.

	Daily	About 3 - 5 times a week	About 3 - 4 times a month	Seldom	Never
Internet	O	O	O	O	O
Desktop computer	O	O	O	O	O
Laptop, notebook or netbook	O	O	O	O	O
Pad or tablet device	O	O	O	O	O
Videogames console such as Xbox®, Playstation®	O	O	O	O	O
Smartphone	O	O	O	O	O
Other cellphone	O	O	O	O	O
Printers or scanners	O	O	O	O	O
Mp3 or other portable music device	O	O	O	O	O
Portable USB memory devices	O	O	O	O	O

*E.g. work, school, library, internet cafe, other organisation, private residence

300326779

ICT use at home

Please indicate whether you use ICT for the following activities at home and how often.

	Daily	About 3 - 5 times a week	About 3 - 4 times a month	Seldom	Never
Personal email	O	O	O	O	O
Email for professional, study or schoolwork purposes	O	O	O	O	O
Instant Messaging	O	O	O	O	O
Playing single player games	O	O	O	O	O
Playing collaborative or multiplayer games	O	O	O	O	O
Doing schoolwork, study, or other forms of work	O	O	O	O	O
Smartphone apps	O	O	O	O	O
Social media such as Facebook®, twitter®, Google+®	O	O	O	O	O
Online shopping	O	O	O	O	O
Online auction or trading sites	O	O	O	O	O
News sites	O	O	O	O	O
Reading blogs or opinion sites	O	O	O	O	O
Publish or otherwise work on a personal blog or website	O	O	O	O	O
Publish or otherwise work on a professional blog or website	O	O	O	O	O
Personal interest browsing	O	O	O	O	O
Listening to or viewing media, such as music, videos, photography, art	O	O	O	O	O

300326779

ICT use outside the home*

Please indicate whether you use ICT for the following activities outside the home and how often.

	Daily	About 3 - 5 times a week	About 3 - 4 times a month	Seldom	Never
Personal email	O	O	O	O	O
Email for professional, study or schoolwork purposes	O	O	O	O	O
Instant Messaging	O	O	O	O	O
Playing single player games	O	O	O	O	O
Playing collaborative or multiplayer games	O	O	O	O	O
Doing schoolwork, study, or other forms of work	O	O	O	O	O
Smartphone apps	O	O	O	O	O
Social media such as Facebook®, twitter®, Google+®	O	O	O	O	O
Online shopping	O	O	O	O	O
Online auction or trading sites	O	O	O	O	O
News sites	O	O	O	O	O
Reading blogs or opinion sites	O	O	O	O	O
Publish or otherwise work on a personal blog or website	O	O	O	O	O
Publish or otherwise work on a professional blog or website	O	O	O	O	O
Personal interest browsing	O	O	O	O	O
Listening to or viewing media, such as music, videos, photography, art	O	O	O	O	O

300326779

Ability to perform ICT tasks

To the best of your knowledge, please rate your ability to perform the following.

	Easily by myself	Can manage by myself	Can manage with help	Cannot do even with help	Unsure what this is
Use Microsoft Word® or similar document editor	O	O	O	O	O
Use Microsoft Excel® or similar spreadsheet editor	O	O	O	O	O
Create graphs and tables from spreadsheet data	O	O	O	O	O
Upload photos, to email or Facebook® or similar	O	O	O	O	O
Upload video, to email or Facebook® or similar	O	O	O	O	O
Upload soundfiles, to email or Facebook® or similar	O	O	O	O	O
Edit photos or other graphic images	O	O	O	O	O
Edit videos	O	O	O	O	O
Edit soundfiles	O	O	O	O	O
Create a presentation, using Microsoft PowerPoint® or similar	O	O	O	O	O
Create a multimedia presentation, incorporating sound, pictures, video	O	O	O	O	O
Create a blog post	O	O	O	O	O
Create a webpage	O	O	O	O	O

Thank you very much for taking the time to complete this survey. A summary of the overall research findings and conclusions, as well as the meanings and relevance of the questions, will be made available at the following site:

https://ictfb.wordpress.com/

Jamie Robertson, INFO 580; total word count: 11215