

An exploration of smartphone microblogging
supporting the device, learner and social aspects of mobile
learning within post primary Religious Education

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Declaration

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Education is entirely my own work, that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

Signed: _____

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Table of Contents

	Page
Declaration.....	i
Acknowledgments	ii
Table of Contents.....	iii
List of Figures.....	vii
List of Tables	x
List of Appendices.....	xi
Acronyms.....	xii
Abstract.....	xiii
Conference presentations.....	xiv
Teachmeet presentations.....	xiv
Chapter 1: Introduction.....	1
1.1. Introduction.....	1
1.2. Thesis structure	2
1.3. Aim 3	
1.4. The teaching rationale.....	4
1.5. The research rationale.....	7
1.6. The learning rationale	8
1.7. The context	11
1.7.1. Mobile learning	11
1.7.2. The FRAME model.....	14
1.7.3. Smartphone microblogging.....	15
1.7.4. The learner	15
1.7.5. Post Primary Education.....	16
1.7.6. Post Primary Religious Education	17
1.8. Summary.....	18

Chapter 2: The planning stage: Reviewing the literature	19
2.1. Introduction.....	19
2.2. Reviewing research.....	19
2.2.1. The device aspect.....	21
2.2.2. The learner aspect	25
2.2.2.1. Cognitive learning	25
2.2.2.1.1. Delivery of information.....	26
2.2.2.1.2. Feedback.....	26
2.2.2.1.3. Multimedia affordances.....	27
2.2.2.2. Deeper learning	28
2.2.2.2.1. Reflection	28
2.2.2.2.2. Seamless learning	30
2.2.2.2.3. Collaborative learning	31
2.2.2.2.4. Safe and disruptive learning	33
2.2.2.3. The microblogger	33
2.2.2.4. SAMR.....	34
2.2.3. The social aspect	37
2.2.3.1. Pedagogy	37
2.2.3.2. Online learning communities	38
2.2.4. Research design.....	40
2.3. Learning theories	45
2.3.1. Connectivism	46
2.3.2. Social constructivism	48
2.4. Summary	50
Chapter 3: The acting and observing stage: Research Design.....	51
3.1. Introduction.....	51
3.2. Philosophical underpinnings.....	52
3.3. Epistemology	53
3.4. Methodology	54
3.5. Sampling	55
3.6. PAR Stages of implementation.....	56

3.7. Pedagogy.....	59
3.8. Ethics.....	60
3.9. Validity and reliability	62
3.10. Data collection	63
3.10.1. TAM.....	65
3.10.2. Pre and post questionnaires and surveys.....	66
3.10.3. Edmodo	67
3.10.4. Focus groups	67
3.10.5. Research journal.....	68
3.11. Data analysis	68
3.12. Summary.....	70
Chapter 4: The acting and observing stage: The findings	71
4.1. Introduction.....	71
4.2. Data collection	72
4.3. A mixed methods approach	73
4.4. The device aspect.....	73
4.4.1. TAM.....	73
4.4.2. Technical challenges and technical conveniences	77
4.5. The learner aspect	81
4.5.1. Cognitive learning.....	82
4.5.2. Collaborative learning.....	85
4.5.3. Online student-centred mobile learning management system	94
4.5.4. Reflection	98
4.6. The social aspect.....	102
4.6.1. Pedagogy	102
4.6.2. A virtual learning community	104
4.6.3. A safe space	108
4.7. Summary.....	110

Chapter 5: The reflection stage: Interpreting the findings.....	111
5.1. Introduction.....	111
5.2. The device aspect.....	111
5.3. The learner aspect	116
5.3.1. Cognitive learning.....	116
5.3.2. Collaborative learning.....	119
5.3.3. Online student-centred mobile learning management system	122
5.3.4. Reflection	123
5.4. The social aspect	128
5.4.1. Pedagogy.....	129
5.4.2. A virtual learning community	131
5.4.3. A safe space	132
5.5. Summary	136
 Chapter 6: The reflection stage: Conclusions and recommendations.....	 137
6.1. Introduction.....	137
6.2. Summary	137
6.3. Conclusions.....	138
6.4. Recommendations.....	140
6.5. Contributions to new educational knowledge.....	142
 Bibliography	 146
 Appendices	 1

List of Figures

Figure 1.1: The three aspects of FRAME model	15
Figure 2.1.: The first five steps involved in reviewing research articles	20
Figure 3.1.:Research design on smartphone microblogging supporting the device, learner and social aspects of mobile learning in post primary Religious Education	51
Figure 3.2.: The five stage plan	59
Figure 3.3.: Mobile Implementation Framework	64
Figure 3.4.:Timeline of data collection sources positioned within the three stages of this PAR research	65
Figure 3.5.: TAM for smartphone microblogging in post primary Religious Education	66
Figure 4.1.: Summary of findings related to FRAME model	71
Figure 4.2.: TAM’s first three variables - perceived usefulness, perceived ease of use, personal innovativeness	74
Figure 4.3.: Fourth TAM variable – Students’ personal demographics: How often do you use your phone?	75
Figure 4.4.: Fourth TAM variable-Students’ personal demographics: Do you use your smartphone for?	76
Figure 4.5.: Fourth TAM Variable - Students’ personal demographics: If you have a smartphone which of the following apps or platform do you use regularly?	77
Figure 4.6.: Post containing a screen shot outlining technical difficulties with Edmodo’s quiz feature from class group 1, dated 18th March 2015	78
Figure 4.7.: Colloquial chats during the initial stage of smartphone microblogging among class group 1, dated March 13th 2015.	79
Figure 4.8.: Excerpt of online discussion on Edmodo from class group 5,.....	81
Figure 4.9.: An example of a student’s post detailing synchronised textual and visual channels of information from class group 1, dated 18th of March 2015.....	82
Figure 4.10.: Percentage of students who uploaded posts and did not upload posts.....	83
Figure 4.11.: Pre and post research questionnaire results of correct answers regarding students’ cognitive learning of Images of God.....	84
Figure 4.12.: The number posts and the numbers of people involved in an online conversations on Edmodo.....	86

Figure 4.13.: Types of students’ replies to peers post	87
Figure 4.14.: Praising a peers’ post from class group 2, dated 23rd of April 2015	87
Figure 4.15.: An example of an online Edmodo conversation highlighting collaborative peer scaffolding from class group 3, dated 21st of March 2015	88
Figure 4.16.: Advancing understanding of ‘Images of God’ through collaborative learning from class group 4, dated 22nd of March 2015	90
Figure 4.17.: A student’s questions an individual’s image of God from class group 5, dated 24th of April 2015	90
Figure 4.18.: Collaborative learning on Edmodo supporting the advancement of students’ understanding and meaning of ‘Images of God’ from class group 4, dated 22nd of March 2015	91
Figure 4.19.: A student’s post on diverse images of God within Edmodo from class group 5,	92
Figure 4.20.: An Edmodo post displaying an agnostic image of God from group 4,	92
Figure 4.21.: An example of collaborative critical thinking from class group 3, dated 18th to 25th of March 2015	93
Figure 4.22.: A conversation highlighting an absent student asking for homework missed from class group 1, dated 20th of March 2015	95
Figure 4.23.: Edmodo accessed by a student from abroad from class group 4, dated 18th of May 2015	95
Figure 4.24.: A student’s Edmodo post depicting and describing their image of God from class group 2, dated 17th March 2015	96
Figure 4.25.: An Edmodo post describing an image of God from class group 2, dated 21st April 2015	97
Figure 4.26.: An Edmodo post depicting an image of God from a picture at home from class group 5, dated 10th of March 2015	97
Figure 4.27.: Percentage of students’ image of God categorised from pre and post-research questionnaires	100
Figure 4.28.: A student’s posts on their changing image of God from class group 2, dated 21st and 26th of March 2015	101
Figure 4.29.: Types of posts uploaded by the teacher onto Edmodo	103

Figure 4.30.: An example of the teacher’s lower order question and student’s reply from class group 4, dated 22nd and 23rd of March 2015.....	103
Figure 4.31.: Resolving technical issues from a student in class group 2, dated 15th of March 2015	104
Figure 4.32.: Positive affirmation posts on Edmodo from class group 5, dated 20th of May 2015	105
Figure 4.33.: An Edmodo a conversation on Images of God that extended to the concept of prayer from class group 4, dated 21st and 22nd of March 2015	107
Figure 4.34.: A student’s post: ‘I never thought about my images of god but this what I think’, post from an individual student from class group 3, dated 24th of April 2015	109
Figure 4.35.: A student’s post: ‘I am a humanist’ from class group 5 from class group 5, dated 22nd of April 2015	109
Figure 5.1.: An example of reflection within an online conversation on Edmodo from class group 3, dated 14th of April 2015.....	126

List of Tables

Table 3.1.: Stages, timeframe and practices of AR Cycle	58
Table 3.2.: Risks and implementing plans	62
Table 4.1.: Summary of data collection sources and number of students involved	72

List of Appendices

Appendix A: Key skills and their elements outlined in the Junior Cycle.....	1
Appendix B: Results from Scopus search using keywords smartphone microblogging Religious Education.....	2
Appendix C: Author, Date, Title, Research Question, Findings, Sample Number, Country, Educational Institution from the reviewed research	3
Appendix D: Substitution Augmentation Modification Redefinition Model (SAMR)	5
Appendix E: Bloom's Reviewed Taxonomy (Anderson, Krathwohl et al. 2001)	6
Appendix F: Ethics approval from DCU Research Ethics committee.....	7
Appendix G: Letter of Plain Language Statement for parents and guardians	8
Appendix H: Consent form for parents and guardians	10
Appendix I: Consent and assent forms for student participants	12
Appendix J: Pre-research questionnaire	14
Appendix K: Pre-research survey	17
Appendix L: Post-research questionnaire	21
Appendix M: Post-research survey.....	23
Appendix N: The FRAME model (Koole 2009)	27
Appendix O: Focus Group questions.....	28

Acronyms

AoIR	Association of Internet Researchers
App	Application
AR	Action Research
BYOD	Bring Your Own Devices
CMC	Computer Mediated Communication
DEIS	Designated disadvantaged
DES	Department for Education and Skills
EACEA	Europe's Education, Audiovisual and Culture Executive Agency
ETB	Educational Training Board
EU	European Union
FRAME	Framework for the Rational Analysis of Mobile Education
ICT	Information Communication Technology
MOLJ	Mobile Online Learning Journal
NCCA	The National Council for Curriculum and Assessment
OFCOM	The Office of Communications in the United Kingdom
PAR	Participatory Action Research
PD	Professional development
SAMR	Substitution Augmentation Modification Redefinition Model
SEN	Special Educational Needs
TAM	Technology Acceptance Model
TY	Transition Year
VEC	Vocational Education Committee
WHO	World Health Organization
WWW	World Wide Web
ZPD	Zone of Proximal Development

Abstract

Ciara Morrison-Reilly

An exploration of smartphone microblogging supporting the device, learner and social aspects of mobile learning within post primary Religious Education

Within Religious Education in the Irish post primary sector, there is little evidence of smartphone use for supporting mobile learning. This research aims to address this shortcoming by exploring our experience of smartphone microblogging supporting mobile learning. A participatory action research (PAR) methodology was employed. Research participants involved one teacher-researcher and a hundred and five first year post primary students of Religious Education from an Educational Training Board (ETB) school. A mixed method design was employed using both quantitative and qualitative data from pre and post online surveys, pre and post-research questionnaires, focus groups, online posts from Edmodo and the teacher-researcher's own reflective journal. The research question was 'What were our experiences of smartphone microblogging supporting mobile learning on 'Images of God?' 'Images of God' is a module from the Junior Certificate Religious Education syllabus. Mobile learning was defined as consisting of three aspects: the device, learner and social aspect as theorised in Koole's (2009) Framework for the Rational Analysis of Mobile Education (FRAME) model. First, the device aspect of mobile learning examined Edmodo's technical challenges and conveniences as well as measuring research participants' perceptions through the Technology Acceptance Model (TAM) research instrument (Davis 1989). Second, the learner aspect of mobile learning explored students' use of Edmodo for supporting cognitive learning, collaborative learning and deeper learning within post primary Religious Education. Third, the social aspect of mobile learning investigated Edmodo as a virtual learning community and a safe space for the students to disclose and discuss their personal images of God that included agnostic and atheist worldviews. The social aspect also provided an insight into suitable pedagogy stemming from relevant mobile learning theories for supporting smartphone microblogging. This research concluded with recommendations for practising smartphone microblogging for supporting mobile learning within post primary Religious Education.

Conference presentations

Morrison-Reilly, C. 2016. Smartphone microblogging supporting mobile learning in post primary Religious Education. *Virtuous Practices for a Worldwide Conversation*. York St. John University, UK, 5th – 6th of July.

Morrison-Reilly, C. 2016. Smartphone microblogging for supporting mobile learning in post primary Religious Education. *Education as a Public Good*. Educational Studies Association of Ireland 41st Annual Conference, National University of Ireland Galway and Raddison Blu Hotel, Ireland, 31st of March - April 2nd.

Teachmeet presentations

Morrison-Reilly, C. 2015. The 24/7 classroom. *Recharge*. Louth Meath Educational Training Board Teachmeet, Coláiste na Mí, Navan, Ireland, 21st of March.

Morrison-Reilly, C. 2012. Smartphones in education. *North East CESI meet*. Crowne Plaza Dundalk, 9th November.

‘Resenting a new technology will not halt its progress’ (McLuhan 1969)

“Banking” education, unfortunately, still runs pervasive in religious education. Critical religious educators have diligently sought to move away from this model, which is based on the transmission of objective facts, to other models that empower faith communities to contribute to the transformation of the world’ (Rogers Jr. 2011)

‘I don’t have an image of God. I think God gave us a blank canvas to draw him in any way we like’ (First year post primary Religious Education student 2015)

‘Young people don’t have tribes any more. We have smartphones instead.’ (Jones 2016).

Chapter 1: Introduction

1.1. Introduction

The prevalence and popularity of smartphones among young people are evident within contemporary Irish society. Smartphones are portable handheld computers, the ‘Swiss army knife’ of technology that include digital cameras, video recorders, internet access, texting, e-mail and apps (Thomas et al. 2013, p.296). Blogging is the activity of regularly writing about one’s experiences or sharing information which can be uploaded and published as posts on the World Wide Web (WWW). Smartphone microblogging involves publishing short posts onto a microblog through smartphone applications (apps). Smartphone microblogging can potentially support mobile learning. Mobile learning is essentially ‘learning across multiple contexts, through social and content interactions using personal electronic devices’ (Crompton 2013, p.4). In Ireland, there has been little empirical evidence to date of students employing microblogging to enhance mobile learning in the study of Religious Education at post primary level. As ‘Mobile technology is booming, will religious educators have a voice at that table?’ (Daily 2013, p.124).

Within this research a participatory action research (PAR) methodology has been adopted. In line with this methodology, I as the teacher-researcher and a cohort of first year post primary students as participating co-researchers, have explored the impact of microblogging as an element of mobile learning. It is anticipated that the project will contribute to the limited body of knowledge on the subject. This PAR research constitutes a second action research (AR) cycle. It provides a continuum to ‘*Digital Mobile Religious Education: An exploration into the employment of the smartphone as an educational tool for post primary Religious Education*’ (Morrison-Reilly 2013). This first AR cycle explored transition year (TY) students use of the smartphone video-making app Animoto and the smartphone microblogging app Edmodo as educational tools for supporting learning about ‘Images of God’ from the Muirdeach High Cross, Co. Louth. Findings from this first AR cycle discovered that students responded positively to the use of Edmodo for supporting their learning about ‘Images of God’. Furthermore students indicated a preference for the smartphone microblogging app Edmodo over the smartphone video-making app Animoto as a learning tool. Subsequently, within this

second AR cycle we have aimed to conduct a rigorous exploration of the impact of microblogging as an element of mobile learning. The exploration has been underpinned by the guiding principles of Koole's (2009) Framework for the Rational Analysis of Mobile Education (FRAME) model. This FRAME model facilitated navigation through the various AR stages of this research. This model describes mobile learning as a process involving three aspects; the device aspect or mobile technologies, the learner involving 'human learning characteristics' and the social aspect which includes pedagogy (Koole 2006, p.ii).

1.2. Thesis structure

The thesis structure outlines a summary of the six chapters. These six chapters follow the sequence of planning, acting and observing and reflection as detailed in Kemmis and McTaggart's (2005) AR cycle. The planning stage outlined in chapters one and two, progresses to the acting and observation stage in chapter three and four and the process concludes with the reflection stage in chapters five and six. Chapter one presents an overview of this exploration, namely the aim, the research question, the rationale and context of this research. The literature review outlined in chapter two examines empirical research on mobile microblogging and blogging supporting mobile learning within educational institutions and religious communities. The FRAME model (Koole 2009) was employed for systematically steering, investigating and evaluating empirical research within the literature review. Chapter three describes the philosophical underpinnings, ontology, epistemology, PAR methodology, mixed design methods, ethical standards, rigour and validity procedures within this research. Chapter four presents the findings from analysis of quantitative and qualitative data collected on the employment of smartphone microblogging supporting mobile learning on 'Images of God'. Chapter five interprets the findings emerging from the exploration of our experience of smartphone microblogging. Chapter six presents the conclusions, the contributions to new educational knowledge and offers recommendations on microblogging for supporting mobile learning in Religious Education at post primary level.

1.3. Aim

This research is an exploration of microblogging centred on the Religious Education module ‘Images of God’, a module from the Junior Certificate Religious Education syllabus. The module ‘Images of God’ was chosen for this research as it was selected as a learning topic for the first AR cycle. Furthermore, this learning topic incorporates a variety of sources that encompass both religious traditions and non-religious worldviews. Both religious traditions and non-religious worldviews are prevalent within a multi-denominational school such as the one where this research took place. The learning objectives of ‘Images of God’ envisage that students should have ‘an awareness of the variety of images of God and their sources... including the student’s own experience’ and should be able ‘to articulate their own images of God and to identify their sources’ (DES 2000, p.29). This exploration on smartphone microblogging has investigated the device, learner and social aspects of mobile learning as identified in the FRAME model (Koole 2009). The device aspect explored our experiences and perceptions of employing smartphones and the smartphone microblogging app Edmodo for learning. The device aspect also examined the technical performance of the smartphone and Edmodo.

Edmodo is a free microblogging facility that can be accessed from both mobile devices and fixed desktop computers. Edmodo is specifically designed for educational purposes that supports a global social network of connected learners. To date there are sixty five million users subscribed to Edmodo. Edmodo provides a user friendly way for teachers to create and support an online learning community that can be accessed anytime and from anywhere. Unlike the microblogging platform Twitter Edmodo is a password secured microblogging platform that allows the teacher to moderate or approve students’ posts and replies before they are uploaded online for other learners to see. Consequently unlike Twitter Edmodo offers a private room rather than a public square microblogging platform that safeguards online security and safety. Research has discovered that Edmodo is a valuable microblogging tool that facilitates learning across a wide range of subjects and within a diverse range of learning contexts (Singleton 2016; Cipolla-Ficarra 2014; Krejci and Siqueira 2014; Paliktzoglou and Suhonen 2014; Perifanou 2009).

The learner aspect has studied the cognitive learning of facts and reflective construction of personalised knowledge on 'Images of God' through Edmodo's mobile and online collaborative learning network. The social aspect has evaluated Edmodo's online learning community collectively learning about 'Images of God'. The social aspect also underpinned my pedagogical approach in supporting students' mobile learning through their use of Edmodo. The purpose of this research has been the investigation of our experience of smartphone microblogging supporting mobile learning on 'Images of God'.

The project was targeted at a cohort of first year Religious Education students through the use of the following research question: 'What were our experiences of smartphone microblogging supporting mobile learning on 'Images of God?'' Mobile learning in this question incorporates the device, learner and social aspect as outlined in the FRAME model. This question is predicated on a mixed method design that involves the collection and analysis of both quantitative and qualitative data. It incorporates the integral stages of this AR research cycle and encompasses the 'characteristics of a good action research question' (Pine 2009, p.239), as it tackles a real world challenge, namely practicing smartphone microblogging for supporting mobile learning within post primary Religious Education. The research question underpins the rationale. Within the context of this exploration, the rationale pinpoints the possible benefits smartphone microblogging could offer research on mobile learning within post primary Religious Education, my students' learning and my teaching practice.

1.4. The teaching rationale

The teaching rationale centres on the potential that smartphones afforded me in informing and improving my professional teaching practice through the realisation of my pedagogical vision and affirmation of the values derived from my diverse teaching experiences. The rationale stems from my diverse teaching experiences over the past twenty five years. In Ireland, I had a positive teaching experience of integrating ICT within my post primary Religious Education classroom through collaborative projects like Dissolving Boundaries (<http://www.dissolvingboundaries.org/>) and eTwinning (<https://www.etwinning.net/en/pub/index.htm>). In South Korea, I witnessed my students utilising smartphones as effective learning tools for advancing their English language

skills. I also observed some Protestant Christian churches effectively employing smartphone microblogging as ministry tools for connecting and communicating with their members within the South Korean city of Seoul. While teaching in Finland, I experienced a more creative, collaborative, active-based and student-centred learning approach to teaching and learning. These diverse teaching experiences have influenced my vision for post primary Religious Education.

My vision embraces a more relevant and real learning experience facilitating students' connection with their individual self, the collective others and the transcendental Other. My vision aspires to create a connected learning experience that reflects Senge's (1990) view of the learning organization where learning is not a separate individual experience but a 'collective aspiration...where people are continually learning to see the whole together' (p.3). My vision also aspires to support whole knowledge creation that generates a more holistic learning experience. Firstly, within this research I aimed to provide students with practical knowledge that helps them achieve the outlined learning objectives, as well as hands on training on how to utilise the smartphone microblogging app Edmodo. Secondly, within this research I aimed to support students' access to knowledge with intrinsic worth that empowers them to become self-aware and self-reflect on their connections with self, others and the transcendental Other through online interconnections and conversations on 'Images of God' facilitated by smartphone microblogging (De Souza 2006; Grimmitt 1987; Tillich 1969). My vision therefore contradicts the traditional transmission 'industrialised, mechanistic, controlled and conformist factory model' of traditional Western pedagogy (Robinson 2011, p.139). I often deployed this type of pedagogy in dispensing information to passive students in preparation for the Religious Education Junior Certificate examination. Rogers book '*Finding God in the Graffiti*' (2011) criticises American school based religious educators for using the transmission model of teaching where students bank facts rather than actively creating and contributing to transforming the world. My experience of post primary Religious Education is similar to Looney's (2006) belief that there is an emphasis on banking facts thus promoting a more 'educational and less religious' experience (p.963). This experience motivated me to realise my vision as a teacher of Religious

Education centred on supporting the educational and religious by leading students into ‘a space of personhood’ that connects with both the head and heart (Hederman 2012, p.10).

My vision is rooted in my personal values of respect, diversity, democracy, care, integrity and trust that empower students as ‘active agents in the learning process’ (The Teaching Council 2012, p.7). Gray (2009) argues that it is vital for AR researchers to explicitly identify their own values in order to ‘explore the relationships between these values and our own behaviour’ within the specific contexts in which we act and research (p.320). This AR research was therefore not about inquiring into Edmodo’s affordance as a delivery tool for teacher-generated content. Conversely, the research aimed to support students as co-creators of knowledge that could reveal, reflect, collaborate, critique and create their own personal images of God through their use of Edmodo.

I appreciate that my vision incorporating smartphone microblogging for supporting my teaching practice involves a rethinking of relevant learning theories, methodologies and pedagogy. I also acknowledge the inherent risks involved in using smartphone microblogging such as the dearth of theoretical pedagogical strategies, the lack of empirical research, ambiguous school policies and national guidelines. I realise that smartphone microblogging is positioned within the pedagogical spectrum as a blended learning tool that can never substitute the face to face teaching and learning performed within the classroom. I also appreciate that this exploration of microblogging is an uncertain predictor of educational outcomes but I acknowledge that ‘one of the things that we must do as teachers is twirl around and around, and find out what works with the situation that we’re in. Our models might not work. And that twirling, changing, is part of the empowerment’ (Hooks 1999, p.128). I view my teacher-researcher role as a practitioner-theorist co-researching with students within ‘the swampy lowlands’ of smartphone microblogging that may lead to the ‘high ground’ of presenting insights and recommendations for future students, teachers, researchers and policy makers (Mc Niff and Whitehead 2011, p.19). This PAR research process intends to make original contributions to knowledge from our experiences of practicing smartphone microblogging. Through exploring our experience of smartphone microblogging within an AR cycle, it is hoped that our ‘theoretical and practice knowledge base’ may result in

improving my teaching practice and advancing my students learning (Kumar 2014, p.3). Consequently, the teaching rationale incorporating my teaching practice experiences, values and vision validates the research rationale.

1.5. The research rationale

The rationale for pursuing this research rests on the premise that empirical research on mobile learning using smartphones in the study of Religious Education at post primary level is absent in Ireland. This research attempted to address some of these gaps through exploring the use of Edmodo for supporting mobile learning beyond the post primary Religious Education classroom. Mobile learning has flourished in the last decade with key researchers like Kukulska-Hulme, Sharples, Ally, Koole, Kolb, Traxler and Naismith focusing on its theoretical perspective. As mobile learning is often dismissed as unreliable, incomplete and inconclusive (Daily 2013; Ng and Nicholas 2013; Wang and Shen 2012). Sharples (2013) branded research and practice on mobile learning as ‘in their infancy’ (p.5). Various commentators have identified shortcomings in relation to current research. For example Cochrane (2013) argues that current research on mobile learning is ‘predominantly around the immaturity of research approaches and evaluation strategies taken’ (p.30). Wang and Shen (2012) identifies a lack of guidelines on mobile learning design and pedagogy. To date much attention has focused on research on mobile learning within higher education, in areas such as initial teacher education and teachers’ professional development. Carpenter and Krutka (2014) identified a specific gap in research regarding microblogging, specifically Twitter, supporting mobile learning. Carpenter and Krutka (2014) recommended that future research should explore the use of microblogging for class activities within K-12 settings which may explain ‘Why educators who evidently see value in using Twitter for their own learning might choose not to use it with their students’ (p.430). The DES report ‘*Investing Effectively in Information and Communications Technology in Schools, 2008-2013*’ recognised the need for research on mobile learning within the Irish educational context: ‘While technology has become more mobile, there is a significant and unexplored digital divide between the technology used outside school and that inside’ (Morrissey et al. 2008, p.8).

To date international research on mobile learning within school based Religious Education is scarce. Research on mobile learning is predominantly centred on particular religious communities' sense of ritual, identity, community, authority and belief as the following examples highlight:

- Employing phones for communicating faith among Pentecostals and umbandistas, an Afro-Brazilian religion (Da Silva 2015)
- Mobile learning within Islamic education (Nawi et al. 2015)
- Online mission and ministry within the United Kingdom's Christian clergy and community (Smith 2015)
- Phone use within ultra-Orthodox Judaism (Rashi 2013)
- Social media including blogging within the American Catholic Church (Vogt 2011)

Grieve (2013) believes that religion is currently evolving towards 'a third wave of research on digital religion' that includes interactive apps that support co-production (p.113). This research intends to contribute to this third wave of research on digital religion by closing the apparent gap between mobile learning theory and the reality of practice and pedagogy. The rationale stems from the possible benefits research on smartphone microblogging could offer to me as a teacher and to my students as a support for their learning.

1.6. The learning rationale

Another reason for undertaking this research relates to the learning rationale. This rationale stems from the possible benefits smartphones offer students' learning as a ubiquitous ICT device and as a mobile learning device. ICT benefits individuals living, working and learning within today's society. National and international governments acknowledge the importance of equipping citizens with ICT skills in the promotion of full and inclusive societal participation, economic growth and social progression within today's digitally connected world (DES 2015a; European Commission 2014; DES 2012b; UNESCO 2011). Research has highlighted the educational benefits of ICT as 'one of the most useful teaching tools' for supporting 21st century learning (Batsila et al. 2014, p.59). For example, research has discovered that ICT advanced learner's motivation through online knowledge sharing (Hendriks 1999), created more effective learning environments (OECD 2009), facilitated 'specialisation in curriculum and teaching methodologies'

(Glenn 2008, p.16), offered connections with the world beyond the classroom (Anderson 2010), advancing a more student-centred-learning experience (O'Connor et al. 2011), promoted personalised learning where students create knowledge (Johnson et al. 2015) and for improving learning success among low-learning-achievement students (Shih et al. 2010). Furthermore, research has discovered that digital learning resources plus the real-world learning contexts, advance learning engagement and improve students' learning interest, motivation and achievement (Hwang and Chang 2011; Hwang et al. 2010; Liaw et al. 2010; Liu et al. 2010).

Within Ireland's digital learning landscape various programmes and strategies have emerged in recent times. The '*Digital Strategy for Schools 2015-2020*' (2015) identifies that Bring Your Own Devices (BYOD) technology as part of schools' ICT infrastructure. This strategy notes that schools require guidelines for the successful integration of BYOD into their teaching and learning. The Department of Education and Skills and the Department of Communications, Energy and Natural Resource's high speed 100Mbit/sec broadband programme aims to deliver broadband to all post-primary schools. This high speed broadband is essential for supporting mobile and fixed desktop ICT platforms such as the smartphone microblogging app Edmodo. Coyne et al.'s (2015) recent survey of four hundred post primary schools concluded that despite the obvious benefits of receiving high-speed broadband 'many structural issues that may discourage the use of ICT in the classroom such as rigid class timetables and structured syllabi for state examinations that inhibits pedagogies from incorporating ICT' (p. 375). Conversely the advent of the new Junior Cycle (DES 2015) aims to provide a more innovative teaching and learning experience underpinned by key skills. These eight key skills each contain an ICT component namely using ICT for communicating, exploring and creating texts, 'managing myself and my learning', 'being responsible, safe and ethical in using digital technology', accessing, managing and sharing content, developing numeracy skills and understanding, stimulating creativity and working with others (p.13) (See appendix A).

Despite the obvious learning benefits that accrue from the integration of ICT, the 2015 OECD report '*Students, Computers and Learning: Making the Connection*' identified that ICT has not been broadly embraced within our educational lives as 'the real contributions

ICT can make to teaching and learning have yet to be fully realised and exploited' (p.15). Although higher education in Ireland has embraced innovative use of ICT within the field of Religious Education (Fitzsimons 2012; Donlon 2010), I have observed within the field of post primary Religious Education that ICT is often employed solely for delivering information to students based on 'the traditional model of the Victorian classroom' (Conneely et al. 2013, p.1). These findings were reflected in the Irish inspectorate's report: *'ICT in schools: Inspectorate evaluation studies'* (DES 2008) which identified word processing and internet surfing as the most commonly used ICT applications within post primary Religious Education. I would argue that this usage of ICT is reducing its potential for encouraging 'participation, generates engagement and enthusiasm and connects with life outside the school' as aimed for in the Junior Cycle (DES 2012a, p.11) (See appendix A). Furthermore, the *'Digital Strategy for Schools 2015-2020'* envisaged ICT empowering students to 'become engaged thinkers, active learners, knowledge constructors and global citizens to participate fully in society and the economy' (DES 2015a, p.5). Today's 'information economy or knowledge society' is not only driven by ICT but increasingly by mobile ICT devices like smartphones (UNESCO 2011, p.12).

This rationale also stems from my wish to explore the possible benefits that smartphones might confer on students' learning. The *'eir Connected Living Survey'* (2015) involving a small sample of 1,013 households nationwide claimed that 70% of Irish people currently own a smartphone. I acknowledge that this survey on ownership may be biased as it is conducted, in the most part, by those with monetary interest. *'Net children go mobile: Initial findings from Ireland'* (2015) report found smartphones were the most used device for daily access to the internet by Irish nine to sixteen year olds. Many observers have acknowledged the current smartphone revolution as moving 'the Web from our desks to our pockets' (O'Reilly and Battelle 2009, p.1). Schuler (2012) argues that smartphone apps have provided 'an important and growing medium for providing educational content' (p.3). Saylor (2013) maintains that mobile devices like smartphones will transform education as they become 'the standard universal computing platform of the planet' in the near future (p.5). Smartphones offer accessibility to infinite information resources 'reconnect students to their peers, challenge them with real-world data, and involve them in real-world conversations - all providing the relevance that students need

for academic, social, and professional success’ (Schubert 2011, p.8). Research has recorded the potential of smartphones to support mobile learning for:

- Receiving content, computing, communicating anytime, anywhere and with anyone (Quinn 2011)
- Supporting learning within authentic real life contexts (Ekanayake and Wishart 2015)
- Facilitating seamless learning (Toh et al. 2013)
- Creating and constructing new knowledge through collaborative learning and reflection (Leinonen et al. 2016; Wright 2010)
- Improving language skills (Gromik 2012; NCCA 2009)

Despite the educational benefits of employing smartphones for supporting learning ‘*Net children go mobile: Policy Recommendations*’ (2015) report identified that 87% of Irish children between nine to sixteen year olds were banned from using their devices such as smartphones at school. The 2015 Horizon Report predicted that schools would use BYOD technology like smartphones for supporting mobile learning ‘where students take ownership of their education by doing and creating’ knowledge (Johnson et al. 2015, p.1). In this research, I emphatically concur with this theory and would argue that smartphones are a ready available BYOD technology that should be exploited immediately by teachers for supporting mobile learning within and beyond the post primary context.

1.7. The context

All activities operate within a context. Ericsson and Wingkvist (2010) maintain that the mobile learning context must be thoroughly understood, otherwise ‘the mobile learning system will not survive beyond the scope of the initiative and the project’s end date’ (p.184). Within the context of this exploration into smartphone supporting mobile learning, post primary Religious Education, within a postmodernist learning culture, is positioned.

1.7.1. Mobile learning

Mobile learning is difficult to define, investigate and evaluate. Mobile learning involves evolving, erratic, emancipated, implicit and incidental learning that is positioned within borderless formal and informal learning contexts. For this reason and for the purpose of clarity, mobile learning is defined in this research as having three essential aspects; the

device, the learner and the social aspects. This is informed by the FRAME model (Koole 2009). Mobile learning through mobile devices' ubiquity and mobility can potentially expand learning opportunities beyond the barriers of geography, time, gender, race, age and disability. Ubiquity can facilitate continuous and instantaneous connected communication of 'the right thing at the right time at the right place' (Peng et al. 2009, p.175). Mobility implies the mobility of mobile devices potentially liberate, enlarge and extend learning beyond the physical limitations of conventional classrooms' formal learning to flexible informal 'ad hoc social network' learning environments (Sharples et al. 2007, p.9). I appreciate that mobile learning has the potential to complement our innate humanity as connected, social and mobile beings who have always lived in groups where 'mobility has operated at the core of fulfilling such basic needs as food and drink, ... identity and meaning-making' (Danaher et al. 2009, p.1).

Notwithstanding the potential benefits, mobile devices can also present challenges. Research has highlighted health risks associated with the usage of mobile devices. These health risks include exposure to radiofrequency and electromagnetic radiation from mobile devices that may be linked with brain tumours (Redmayne 2013), eye strain (Vignal et al. 2009), cancer (World Health Organization (WHO) 2011) and sleep problems (Rosen et al. 2016). Research has identified psychological challenges linked with the use of mobile devices. Particular concerns include the addiction of users to their mobile devices (OFCAM 2011), as well as an overload of cognitive resources (Terras and Ramsay 2012). The use of mobile devices can also present challenges to personal safety, security and privacy. Internet crime, pornography, sexting and cyberbullying are frequently cited as concerns. Breaches in data and online predators are also pertinent issues. For example, a recent survey discovered that only 18% of Irish parents frequently supervised their children's activity on social networks which researchers indicated was an area that 'could provide a fertile ground for abuse' (O'Higgins Norman and McGuire 2016, p.22). This finding dovetails with similar results conveyed in the '*Net Children Go Mobile: Initial findings from Ireland*' report which identified that 20% of Irish young people, between nine to sixteen years of age, had been bothered by something on the internet, while 22% made online contact with people they never met off line (O'Neill and

Dinh 2015). These results highlight a poor understanding of internet safety and responsibility among Irish young people.

The employment of technology can potentially influence young people's growing sense of identity (Marcia 1966; Erikson 1959). Today's hyper-connected social media supports the 'Selfie Syndrome' (Borba 2016). Some observers like O'Brien (2014) argue that this selfie phenomenon stems from a 'culture of narcissism' (p.14). I would argue that narcissism frequently supported by the use of smartphone microblogging apps like Twitter has the potential to disconnect and erode individual and collective meaning, value, empathy and integrity. Mobile devices, especially smartphones, have been criticised for fostering a disconnection among young people from reality. Turkle (2011) argues that smartphones disconnect young people from engaging in real relationships as 'networked life allows us to hide from each other...We'd rather text than talk' (p.1). De Souza (2012) expands this argument by claiming that technology can disconnect people from each other, from the transcendental Other or God and from their innate spiritual self. Pope Francis (2015) identified a challenge for people as to how to 'employ technology wisely, rather than letting ourselves be dominated by it' (n.p.). He also acknowledged that 'the great challenge facing us today is to learn once again how to talk to one another, not simply how to generate and consume information' (n.p.).

Research has reported on the negative impact of mobile devices distracting learners from learning. For example, Kuznekoff et al. (2015) found that students who engaged in using Twitter during college lectures, scored 10% to 17% less in a test in comparison to those students who refrained from using their mobile devices. Research carried out by Beland and Murphy (2015) discovered that restricting mobile phone use in schools found a 6% improvement in students' performance. Furthermore, a pedagogical challenge in relation to mobile device use for supporting learning, highlights the difficulty in evaluating mobile learning as it is fundamentally personal, spontaneous, opportunistic, pervasive, clandestine, situated, private, impulsive and naturally positioned within informal learning (Ally 2009). Despite these challenges, I believe, like other researchers such as Bartow (2014), Thomas et al. (2013) and Wu et al. (2012), that failing to employ mobile devices as learning tools represents a missed opportunity to advance my students' learning.

Students must be empowered to collaborate and create knowledge whenever and wherever they desire. Furthermore, I would contend that my use of smartphone microblogging is an innovative and economic way to potentially improve my pedagogical knowledge, skills and methods relevant to post primary students' learning.

1.7.2. The FRAME model

Mobile learning is 'learning across multiple contexts, through social and content interactions using personal electronic devices' (Crompton 2013, p.4). Mobile learning is instinctive and impulsive and therefore 'tends not to compartmentalize itself or act in ways that are always wholly consistent with our theoretical assumptions' (Barab et al. 1996, p.209). A recent search on Google produced over five million definitions for mobile learning. Consequently, it is necessary to establish a framework in order to effectively practice and research mobile learning. Frameworks specific to mobile learning have been designed by various researchers. For example, the M-COPE framework within higher education (Dennen and Hao 2014), a framework for mobile learning in schools embracing all school stakeholders (Ng and Nicholas 2013), a pedagogical framework positioning authenticity, collaboration and personalisation as fundamental features embedded in a sociocultural perspective (Kearney et al. 2012), a pedagogical framework underpinned by transactional distance theory (Park 2011), a framework embracing authenticity, customisation and social inactivity (Kearney et al. 2010) and Koole's (2009) FRAME model. For the purpose of this research I considered Koole's (2009) FRAME model as the most appropriate theoretical lens. This FRAME model entails a triadic interactive relationship between the device, learner and social aspect of mobile learning as outlined in Figure 1.1.:

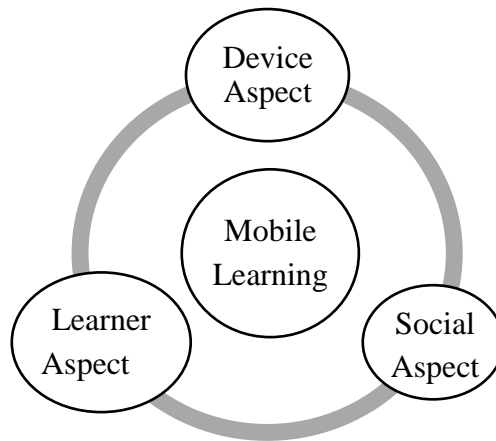


Figure 1.1: The three aspects of FRAME model
Source: Adapted from Koole's 2009 FRAME model (Ally 2009, p. 27)

I consider Koole's (2009) FRAME model ideal for this research as it focuses on the three basic interlinking aspects of mobile learning. These three aspects comprise the technology or device, students or learners and the social aspect which includes pedagogy. This FRAME model will act like a yardstick to help me implement, support, understand, plan, act, observe, reflect, collect and analyse data on smartphone microblogging.

1.7.3. Smartphone microblogging

Blogging is the actual online activity of engaging in and connecting with other users through blogging platforms or blogs. Blogs offer Web 2.0 affordances such as website links, videos, digital photographs and podcasts. More recently blogging as a learning activity has become mainstream within post primary Leaving Certificate English (McGuire 2016). Microblogging typically comprises of brief text messages or posts which can be answered synchronously or asynchronously. Microblogging is a particularly relevant practice among young people who often prefer online communication (Lenharte 2012; Turkle 2011). Smartphone microblogging has the potential to offer a learning opportunity for users to read, share, collaborate, critique, reflect and revise each other's opinions, beliefs, information and knowledge beyond the conventional classroom.

1.7.4. The learner

The learner context of this research addresses the popular opinion that today's young learners who 'grew up bathed in bits' of technology, are naturally 'wired' for social

networked, portable ICT devices (Tapscott and Williams 2007, p.47). This popular opinion is reflected in O'Neill and Dinh (2015) findings that reported approximately 87% of Irish young people between 13-16 years have a profile on a social networking platform. Holding (2011), Zur and Zur (2011) and Prensky (2010) argue that these young 'digital natives' receive information faster and are proficient at networking through their use of technology in comparison with the previous generation of 'digital immigrants'. I would contest these classifications as questionable. I believe that learning is a complex process that cannot be distilled down into definite and distinct taxonomies. I would argue that students' successful use of technology, specifically smartphone microblogging, within post primary learning hinges on their openness to using new technology. I would also argue that students' successful use of technology will be impacted by my planned pedagogical strategies and my reflective practice supporting mobile learning within post primary Religious Education.

1.7.5. Post Primary Education

The context of this research is also positioned within post primary Religious Education. Post primary education aims to provide a holistic learning experience that addresses the intellectual, physical, social, moral, religious and spiritual education of its students. This holistic learning experience entails developing students' key skills in managing oneself, staying well, communicating, being creative, working with others, managing information and thinking, being literate and being numerate as set out in the Junior Cycle (DES 2015b). Contemporary Western education functions within a post-modern society that aspires to embrace a more holistic learning experience supporting a 'caring for ideas, personal theories, self-image, human development' (Watts 1994, p.52). This post-modern holistic reality resonates with the tenets of the mission statement of the particular ETB school where this research is taking place and which is committed to the development of the whole person. The post-modern view is compatible with the view of post primary religious education. Both views lean towards a more holistic human reality where there is an appreciation of a plurality of worldviews both religious and non-religious as well as a strong sense of community (Leuze 1998). These views reject the universal and absolute truths, individualism and hierarchical structures that characterised modernity. Consequently the post-modern view challenges the absolute truth that God exists. On the

other hand the post-modern view celebrates a renewed openness to spirituality and to ‘the conversation about the ultimate goals for life’ (Gallagher 1997, p. 52).

1.7.6. Post Primary Religious Education

Post primary Religious Education aims to ‘explore meaning and its expression in religion...identify and appreciating understandings of God especially within Ireland’s Christian tradition as well as exploring non-religious interpretation of life’ (DES 2000, p.5). This research is situated within a multi-denominational ETB school, formerly known as a VEC school. Traditionally the Catholic Church has strongly influenced the ethos of VEC schools and the provision of religious instruction. The evolution of our education system to embrace pluralism and diversity has tended to dilute the Catholic influence in the majority of these ETB schools, including the one in which I teach. Many observers have identified the ETB schools of today as multidenominational, as they cater for a diverse range of different religions and worldviews (Mc Grady 2013; Mullally 2013). Within the Religious Education classroom, the Junior Certificate Religious Education syllabus is followed. Junior Certificate Religious Education seeks to expose students to ‘a broad range of religious traditions’ with particular reference to the Christian tradition and ‘to the non-religious interpretation of life’ (DES 2000, p.4). In line with this syllabus and in the specific context of the ETB school where this research took place, I focused on two basic germane components of post primary Religious Education namely ‘learning about religion’ and ‘learning from religion’ (Grimmitt 1987). Within the context of this research ‘learning about religion’ implicates cognitive learning and the acquisition of information. ‘Learning from religion’ entails students’ presentation, understanding, reflection and evaluation of their personalised image of God, which may include agnostic and atheistic worldviews. Grimmitt’s (1987) ‘learning about religion’ and ‘learning from religion’ are well positioned within the post-modernist view of Religious Education as intricately woven into all elements of the human experience; the cognitive, spiritual, emotional and moral that assimilates both the inner subjective and outer objective aspects of our humanness (De Souza 2008).

1.8. Summary

This chapter outlines the ‘what, ‘why’ and ‘where’ of this research. The ‘what’ or the aim of the research project as an exploration of the impact of smartphone microblogging, as an element of mobile learning, with particular reference to the Junior Certificate Religious Education Module ‘Images of God’. Mobile learning within this research involves a device, learner and social aspect as underpinned by the FRAME model (Kooole 2009). The ‘why’ implicating the rationale is predicated on the benefits accruing from the utilisation of smartphones, both in terms of improvement of pedagogical practice and advancement of student learning. It also focuses on bridging the research gap in relation to mobile learning that exists in respect of the study of Religious Education at post-primary level. The ‘where’ or context of this research, the benefits and challenges of mobile learning, including smartphone microblogging, were explored with particular emphasis on the young learner immersed in a digitally connected society. The overall context of post primary education in general, and post primary Religious Education in particular, is positioned within a holistic learning experience in a post-modern society. Grimmer’s (1987) ‘learning about religion’ and ‘learning from religion’ is deemed as a suitable programme for the particular circumstances of this ETB school and the Junior Certificate Religious Education syllabus. In chapter two, empirical research on the practice of microblogging and blogging within educational institutions and religious online communities for supporting mobile learning and learning is examined.

Chapter 2: The planning stage: Reviewing the literature

2.1. Introduction

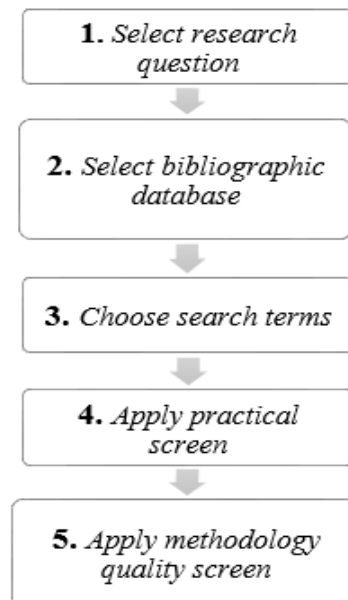
A comprehensive understanding of extant literature in the field is an essential prerequisite to engagement in effective research on smartphone microblogging. In this literature review, I systematically explored and evaluated data ‘gained from observation, experience or experiment’ presented in empirical research on mobile microblogging and blogs supporting mobile learning within formal educational institutions and religious communities (Quinlan 2011, p.12). This literature review informed my teaching practice and facilitated the support of students’ mobile learning through smartphone microblogging. This review also guided me as a teacher-researcher through the planning, acting and observing and reflecting stages of this research. The first half of this literature review investigated empirical research on microblogs and blogs supporting mobile learning based within formal educational institutions and religious online communities. I presented the findings in accordance with the device, learner and social aspects of the Frame model. The second half outlined connectivist and social constructivist learning theories relevant to pedagogy supporting smartphone microblogging.

2.2. Reviewing research

Fink’s (2010) seven step sequential research process was employed for reviewing relevant empirical research on smartphone microblogging supporting mobile learning within post primary Religious Education. This process is predicated on a graduated filtering system. Fink’s (2010) first step involves the selection of a research question (See paragraph 1.3.). In the second step, empirical research articles were selected from Scopus, the world’s largest database of peer-reviewed research. The third step entailed inputting keywords: ‘smartphone’, ‘microblogging’ and ‘Religious Education’ within Scopus’s search filter. This search produced no results (See appendix B). A second Scopus search using more generic words such as ‘blog’, ‘mobile learning’ and ‘religion’, within a 2008 and 2014 timeframe, yielded several relevant articles. The fourth and fifth steps, which relate to practical and methodological screening, applied the following criteria to these selected articles:

- Recent peer reviewed empirical research on mobile microblogging supporting learning through the use of smartphones.
- Research based within formal educational institutions, preferably within post primary schools or the equivalent age related school.
- Student centred learning supporting cognitive learning, collaborative learning and reflection.
- Research emphasising the role of pedagogy in supporting smartphone microblogging.
- A comprehensive insight into research methodology employed.

These first five steps from Fink's (2010) seven step research process ensured that the reviewed research articles would be relevant, rigorous and transferable for this research as illustrated in Figure 2.1.:



*Figure 2.1.: The first five steps involved in reviewing research articles
Source: Fink (2010) Figure 1.1., p. 4.*

Fink's (2010) sixth and seventh steps involved reviewing and synthesising results presented in subsequent paragraphs in this literature review. While the majority of current empirical research in mobile learning originates in Asian education institutions based in China, Taiwan, South Korea and Japan, these selected articles were evenly spread across European, American and Asian educational institutions. Resulting from Fink's (2010) selection process ten relevant and insightful empirical research articles were selected (See

appendix C). The evaluation of these reviewed research articles facilitated an in-depth understanding of the theory and practice of teaching, learning and researching smartphone microblogging within educational institutions. Lee (2009) and Cheong et al. (2008) research on religious online communities focused on static desktop computers rather than mobile devices. I, nonetheless, deemed their research relevant to this literature review as it provided an insight into blogging supporting both ‘learning about religion’ and ‘learning from religion’ (Grimmitt 1987) that relates to this research. An exploration of the reviewed research focusing on the research question ‘What were our experiences of smartphone microblogging supporting mobile learning on ‘Images of God?’ guided this literature review. This research question implicated insights into the device, learner and social aspects of mobile learning, and addressed both the challenges and successes encountered within these reviewed research articles.

2.2.1. The device aspect

The device aspect of mobile learning concerns the ‘technical and functional characteristics of a mobile device’ (Koole 2009, p.28). In the reviewed research the device aspect focused on the mobile devices, the mobile blogging platform and students’ and teachers’ experience of the challenges and successes that technical issues engender. This review unearthed that a diverse range of mobile devices and mobile platforms are used by both teachers and students. Overall results revealed microblogging to be a positive user experience as it was usable, convenient, and enjoyable and often resulted in advancing learner engagement and motivation.

Firstly, the reviewed research studied a diverse range of mobile devices including smartphones. Mauroux et al. (2014) recorded conflicting perceptions of research participants regarding their employment of smartphones to support learning; ‘so easy to use, it’s a piece of cake, not like those old cellphones’ (p.228), ‘I do not like change much... at the beginning I was really not willing to do that’ (p.230). Evans (2014) found that the majority of participants chose to access the microblogging platform Twitter through laptops rather than smartphones. Hsu and Ching (2012) found that participants enjoyed the portability of smartphone microblogging which supported situated learning or learning within their authentic real life contexts. Carpenter and Krutka (2014)

established that participants had positive perceptions of their use of their own smartphones as an inexpensive option for supporting continuous professional development through the free mobile smartphone microblog app Twitter. Mauroux et al. (2014) highlighted the anxiety that permeated one participant's experience of borrowing a smartphone for recording their learning within work placement: 'MF1 was perturbed by the fact that the smartphone 'is not mine, I tend to overprotect stuff that's not mine'' (p.228). Hsu and Ching's (2012) research discovered that careful planning and communication was vital to ensure that all students had access to a mobile device. As a result of this recommendation, I planned to carry out an initial audit of students' smartphone ownership and Wi-Fi access at home and at school.

Secondly, the reviewed research investigated a diverse range of microblogging platforms. Research conducted by Carpenter and Krutka (2014), Evans (2014), Stephansen and Couldry (2014), Junco et al. (2013), Hsu and Ching (2012) considered the educational potential of Twitter. Ebner et al. (2010) examined the mobile microblogging platform MBlog. Although MBlog was introduced with minimum training, data analysis revealed that thirty-six participants posted eleven thousand two hundred and fourteen posts over a six week period. I concluded that this high incidence of posts within MBlog may have occurred due to the designation of posts as a graded assessment activity. Mauroux et al. (2014) examined the employment of a mobile online learning journal for supporting work placement learning. Mauroux et al. (2014) research identified several technical difficulties such as opening folders and uploading pictures. The findings from Krutka et al. (2014) research suggested that the overall benefit of using the mobile microblogging app Edmodo stemmed from its support of collaborative and reflective learning. Both Carpenter and Krutka (2014) and Krutka et al. (2014) discovered that mobile apps like Edmodo and Twitter were more user friendly than traditional desk-based discussion platforms due to their immediate accessibility through portable and ubiquitous mobile devices like smartphones. Taking these research findings into consideration, I considered the password secure smartphone microblogging app Edmodo to be an ideal learning platform for this research as 'participants can be confident that their utterances will not be used against them' (Bergold and Thomas 2012, n.p.). Additionally, I believed that Edmodo's 'Facebook-like interface' was 'highly usable' for participating post primary

first year students (Krutka et al. 2014, p.83). Facebook is the most popular social network platform among Irish eleven to sixteen year olds, with over 80% of young people within this age bracket using Facebook ‘as their main profile’ (O’Neill and Dinh 2015, p.19). While many smartphone microblogging platforms have a similar interface to social media sites regularly used by young learners, I did not presume that students would effortlessly transfer to using smartphone microblogging to support mobile learning. Consequently, I intended to offer a face-to-face workshop on using the smartphone and Edmodo to participating students within this research.

Thirdly, six of the ten reviewed research articles made no reference to the technical training of research participants on the use of various microblogging platforms or mobile devices for learning. Junco et al. (2013) research involved experimental and control groups engaged in training on the microblogging platforms, Twitter and Ning. Stephansen and Couldry (2014) organised Twitter workshops for both students and teachers. Krutka et al. (2014) provided a twenty minute workshop to acquaint students with Edmodo. Mauroux et al. (2014) introduced research participants to a printed user guide that outlined all information in relation to the mobile online learning journal blog. I would argue that deployment of a printed user guide, rather than a face-to-face practical workshop, may have contributed to the resistance exhibited by participants during the initial stages of the research. Furthermore, the reviewed research did not make any reference to training on internet safety in relation to mobile devices and microblogging platforms. As a result of these identified practice based concerns, I planned to conduct a face-to-face workshop on safe and responsible online behaviour in the use of smartphone mobile devices and Edmodo.

Fourthly, overall positive feedback from students centred on microblogs as a usable, enjoyable and convenient experience that advanced their motivation and learning engagement. Krutka et al. (2014) discovered that the microblogging platform Edmodo was useable, user-friendly, accessible and allowed easy tracking of students’ posts. It found that participants’ ability to choose when, where and with whom they wished to interact within Edmodo was viewed as a positive feature. The research also highlighted a negative feature of Edmodo in that its scrolling down feature often resulted in unread

messages, comments and questions. Krutka et al.'s (2014) participants perceived Edmodo as an effective user friendly social learning network that supported peer to peer learning, specifically collaborative reflective learning. Mauroux et al.'s (2014) findings on smartphone online mobile journal blogging highlighted both the benefits and challenges of using smartphones to support work placement learning. This research identified challenges in respect of hygiene issues with participants' hands. The smartphone was thus deemed an unsuitable learning tool for work placement in a bakery. Hsu and Ching's (2012) results indicated that mobile devices were perceived as convenient tools for quick posting of tweets on Twitter making 'it easier to connect with peers in a casual way' (p.222). Research conducted by Mauroux et al. (2014) also ascertained that employing smartphones for educational purposes increased learners' motivation for learning as a result of their portability, personalized accessibility, social and convenience capabilities. Junco et al. (2013) results established a positive correlation between Twitter usage and students' engagement in learning activities. Evans (2014) also acknowledged that learner engagement improved among learners using Twitter. Furthermore, teachers deemed the use of microblogging as a positive learning experience in the monitoring of their students' learning and the support of their professional development. Ebner et al. (2010) established that microblogging presented an opportunity for teachers to monitor the progression and process of learning among students. Carpenter and Krutka's (2014) participants' perceptions of Twitter as a learning tool for supporting teachers' professional development (PD) were positive based on its efficiency, accessibility and personalization affordance for providing 'real-time', 'on-demand' and 'instant access,' 'any time of day, any day of week' 'most personalized form of PD' and 'PD on my terms!' (p.426).

On the whole, the reviewed research provided little insight into the technical challenges associated with the implementation of mobile devices and mobile microblogging within formal education. On one hand, these results were not surprising as mobile devices are rapidly becoming more user friendly as learning tools through the constant improvement in software design. Yet, despite the technical advances of mobile devices and the supporting broadband, the technology supporting learning is not without its glitches. In spite of the educational potential of mobile devices, I would argue that the majority of the reviewed research failed to address the technical challenges associated with the use of

smartphone microblogging within formal education, such as online technical support and poor Wi-Fi connections. In short, the overall consensus of the reviewed research discovered that the device aspect of smartphone microblogging was perceived by both students and teachers to be beneficial in supporting mobile learning. As a result of reviewing these research articles, I hoped to support the device aspect of mobile learning in this research by performing the following specific tasks:

- Employ the password secure smartphone microblogging app Edmodo
- Organise a workshop for students on how to use Edmodo
- Train students on internet safety
- Monitor students' posts to ensure safe and responsible online behaviour
- Provide regular online technical support to students through Edmodo

As identified in the reviewed research microblogs offered teachers the opportunity to regularly monitor students work online and to provide ongoing feedback which in turn increased students' motivation and learning engagement. I believed that the specific interventions instanced above could mitigate the challenges related to the device aspect, specifically Edmodo, within this research. In minimising challenges, positive perceptions of the practice of smartphone microblogging emerged which in turn generated positive experiences in the use of Edmodo. The device aspect of mobile learning is interlinked to the learner aspect.

2.2.2. The learner aspect

The second aspect of mobile learning concerns the learner or 'an individual's cognitive abilities, memory, prior knowledge, emotions, and possible motivations' (Koole 2009, p.29). Cognitive learning, deeper learning, the micro blogger and the Substitution Augmentation Modification Redefinition Model (SAMR) emerged as key categories within the reviewed research (Puentedura 2013).

2.2.2.1. Cognitive learning

The reviewed research established that mobile microblogging and blogging could support cognitive learning. Such learning was facilitated through the participants' engagement in this activity for the delivery of information and feedback. The visual and textual multimedia affordance of microblogs and blogs also facilitated the process.

2.2.2.1.1. Delivery of information

The reviewed research highlighted the use of microblogging and blogs for delivering information. Lee's (2009) research on blogging within Buddhist communities recognised the potential of blogs for delivering information to potential believers. This finding is comparable to Cheong et al.'s (2008) research which also discovered that blogs were used to deliver information within religious communities. The research conducted by Cheong et al.'s (2008) analysed the content of two hundred blogs that posted topics related to Christianity. It revealed that these blogs were used to communicate personal religiously, educational content, religious and social criticism, news and information and coordination of practices regarding social activities around the church community. Research from Carpenter and Krutka (2014) reported that 96% of participants from a sample of seven hundred and fifty five educators, shared and received educational resources through Twitter. This same research also established that over half of teacher respondents failed to use Twitter to communicate with students or to support classroom learning activities, owing to school policies prohibiting 'school-related use of Twitter by students' (p.425). It is evident that there was a genuine concern among post primary teachers who felt wary of using mobile devices within their teaching due to the lack of national policies regarding mobile learning and smartphone use for supporting learning within schools. Accordingly, I intended to present recommendations for the practice of smartphone microblogging for supporting learning within post primary Religious Education. Some of these recommendations may prove helpful to post primary Religious Education teachers wishing to support mobile learning through the use of smartphone microblogging within and beyond the classroom.

2.2.2.1.2. Feedback

The reviewed research established that mobile microblogging and blogs advanced users' cognitive learning through teacher and peer online feedback. Feedback from teachers and peers can potentially advance and accelerate cognitive learning and deeper learning. Ebner et al. (2010) acknowledged the educational value of microblogging for monitoring and scaffolding cognitive learning through prompt and direct online feedback from teachers and peers. This research also established a link between prompt feedback and increased learner motivation. Mauroux et al. (2014) research identified that those

participants who received most online monitoring, support and feedback on their mobile online journal blogging platform attained a higher level of cognitive learning engagement and enjoyment in learning. Junco et al. (2013) research on the use of Twitter for supporting learning, integrated Chickering and Gamson's (1987) seven principles for good practice in undergraduate education into their research design. One such principle advocated prompt feedback to students. The reviewed research identified that feedback enhanced learning and often resulted in increased motivation, engagement and enjoyment of learning. I planned to scaffold students' cognitive learning by providing regular and prompt feedback on their Edmodo posts, with a view to attaining such outcomes from the employment of smartphone microblogging for supporting mobile learning on 'Images of God'.

2.2.2.1.3. Multimedia affordances

The reviewed research established that cognitive learning was supported by microblogs' and blogs' multimedia affordances. These affordances support text, audio and visual channels of communication. Multimedia affordances advance learning, especially encoding and recalling information. Mayer (2009) argues that learners 'learn better when corresponding words and visuals are presented simultaneously' on the same page or screen (p.153). Harper's (2002) neurological position highlights a preference for visuals over text when he explains:

The parts of the brain that process visual information are evolutionary older than the parts that process verbal information. This images evoke deeper elements of human consciousness than do words; exchanges based on words alone utilize less of the brain's capacity than do exchanges in which the brain is processing images as well as words' (p.13).

Research has linked the benefits of using visuals in teaching to increasing learner motivation (Tatar and Robinson 2003), to helping young learners construct and develop their self-awareness (De Souza 2014), to making learning more personally relevant (Ekanayake and Wishart 2015), and to strengthening cognitive learning (Hung et al. 2014; Gunawardena et al. 2009; Van Scoter 2004; Nyí'ri 2002; Kress et al. 2001). Within the reviewed research, Mauroux et al. (2014) research participants took photographs of their work experience using a smartphone app which proved useful for learning. In Hsu and Ching's (2012) research students used their smartphone camera for documenting design

examples from their everyday life. These photographs were subsequently uploaded onto Twitter with a short text based post commenting on the design principle evident in the photograph. These posts or tweets were shared with their peers online through a designated hashtag. I believed that visual stimulus would be especially invaluable to students' learning within this research project, as a cohort of participants comprises students with special educational needs (SEN). I considered that these students might find it challenging to communicate their image of God in instances of limited vocabulary. I therefore deemed that the use of visuals to reinforce text on Edmodo may be of benefit. Consequently, I planned to capitalise on Edmodo's textual and visual communication channels by planning multimedia based homework assignments. These homework assignments would entail students writing text based posts, reinforced by visuals such as their own drawings, personal photographs and self-produced videos within the same post. In summary, the reviewed research provided evidence that microblogging and blogging support cognitive learning through visual and textual multimedia affordances. Cognitive learning was also strengthened through Edmodo's facility to accommodate monitoring and scaffolding of learning. Cognitive learning can occasionally lead to deep learning.

2.2.2.2. Deeper learning

Deeper learning is 'the process of preparing and empowering students to master essential academic content, think critically and solve complex problems, work collaboratively, communicate effectively...and be self-directed in their education' (Martinez and McGrath 2014, p.3). The *'Framework for the Junior Cycle 2015'* advocates deep learning such as 'feedback between teachers and students ... opportunities to enable students to acquire and apply their knowledge and learning and to use information in creative ways...afford students opportunities for independent thought and reflection' (DES 2015b, p.30). Evidence from the reviewed research indicated that mobile microblogging and blogs have the potential to support deeper learning through their support of reflection, seamless learning, collaborative learning, safe and disruptive learning.

2.2.2.2.1. Reflection

Raelin (2001) argues that reflection assists in the reconstruction of past knowledge with present experience by illuminating 'what has been experienced', thus providing a 'basis

for future action' (p.11). Reflection can offer learners an opportunity to question, evaluate and revise their current beliefs, bias, assumptions and knowledge. The reviewed research identified that mobile microblogs and blogs supported deeper learning by enabling reflection among bloggers within religious communities (Lee 2009; Cheong et al. 2008) and, to a lesser extent, among students engaging in mobile microblogging (Carpenter and Krutka 2014; Evans 2014; Krutka et al. 2014; Mauroux et al. 2014; Stephansen and Couldry 2014; Junco et al. 2013; Hsu and Ching 2012; Ebner et al. 2010). The reviewed research reported that although microblogging was perceived as supporting reflection, in reality such 'reflection' was often reduced to surface description. For example, Krutka et al. (2014) discovered that although the majority of research participants perceived the microblogging platform Edmodo as a valuable collaborative reflection learning tool, nearly 70% of posts were descriptive in nature and therefore failed to achieve critical reflection. Although Mauroux et al. (2014) found that smartphone digital photographs effectively prompted 'apprentices to review the pictures and become aware of mistakes, imperfections or successes ...and reflection' (p.219), there was little evidence of critical reflection. I understood critical reflection to be, within the context of this research, reflection leading to the transformation of a learner's personal 'frame of reference', perceptions, principles, positions and perspectives. In my evaluation of the reviewed research, I found that critical reflection was not possible as participants' reflection was not supported by relevant pedagogy. This argument was endorsed by Mauroux et al.'s (2014) finding which identified a need for regular and robust feedback from teachers on students' work to promote deep personalised reflection.

Reflection within Religious Education is viewed by the religious educator De Souza (2003) as an intuitive spiritual human attribute that offers a 'glimpse of and experience moments of deep sacredness and transcendence in their everyday' (p.276). The reviewed research from Lee (2009) and Cheong et al. (2008) acknowledged that blogging within religious communities provided evidence of reflection on the spiritual self. This reflection on the spiritual self, resulted in experienced moments of sacredness. Research on blogging among Buddhist nuns and priests conducted by Lee (2009) recorded that cultivating the religious spiritual self, within the 'liberal settings' offered by blogs, facilitated reflection. As one Buddhist blogger articulated: 'This liberal setting better

helps me to reflect any episode of awakening and my vow as a priest' (p.106). Lee (2009) observed that some bloggers felt liberated through online sharing, by using blogs to reflect on challenges encountered outside the Buddhism organisation. This reflection, through the use of blogs resulted in a transformative learning experience. One blogger articulated 'a lot of lay people and non-Won Buddhists left positive feedbacks and disclosed their sorrows and pains privately, I found my life as a priest worth living' (p.106). Cheong et al. (2008) found that within a small number of the two hundred blogs analysed, individuals reflected on their personal beliefs and experiences. This research established that the majority of blogs were concerned with personal descriptions of experiences, emotional responses and opinions about their Christian God, with few blogs focusing on reflecting on their personal beliefs and experiences.

These examples of reflection from the reviewed research did not identify whether the reflection was reflection-in-action or reflection-on-action. Within the context of this research, reflection-in-action is reflection that happens during the microblogging activity whereas reflection-on-action takes place after the microblogging activity (Schön 1983). Within this research, I planned to engage students in reflection-in-action through construction of textual posts, digital photographs and drawings on their unique image of God. I also intended to design questions in the post survey in order to encourage students to engage in reflection-on-action by reviewing their pre and post images of God at the end of the smartphone microblogging activity. Additionally, through planned homework assignments and prompt personalised feedback, I hoped to encourage students to engage in both reflection-in-action and reflection-on-action which may result in critical reflection.

2.2.2.2.2. Seamless learning

Seamless learning is a feature of mobile learning. Seamless learning is essentially individual and collaborative learning across numerous learning contexts both in the formal context of the classroom and in the authentic informal contexts of the real world of life's 'matrix of learning spaces' (Toh et al. 2013, p.303). Seamless learning can support deep learning through the connections between formal and informal contexts by 'helping young people to make deep sense of the world despite the changing context'

(Sharples 2015, p.53). The reviewed research revealed that mobile microblogging and blogging facilitated seamless learning. Learners practicing mobile microblogging perceived seamless learning as a positive experience as it extended learning into the authentic real world beyond conventional face-to-face formal classroom settings (Hsu and Ching 2012). Although desktop computers rather than mobile devices were used within Cheong et al. (2008) their results identified that the positive affordances of blogs supported seamless learning by connecting religious community members online across diverse international locations, connections that are not possible in traditional offline Church communities:

One respondent, who was a pastor, mentioned that the blog was “an extension” of his ministry, saying “blogs are a good way to create a place for others to know me better and connect with them more than 1–2 times a week face-to-face.” (p.124)

Similarly, in Hsu and Ching (2012) students perceived that Twitter made learning ‘more relevant and motivating’ (p.219), as it provided a seamless learning platform for applying their graphic design knowledge to authentic family environments: ‘It provides an opportunity to seek out examples of content in the real world... It is exciting to share findings with the class and comment on others’ finds’ (p.221). As a result of examining the reviewed research, I considered using smartphone microblogging to support seamless learning. I planned to set learning activities as homework assignments, outside of the formal timetabled Religious Education class and so bridge ‘the gap between formal and informal learning and encourage students to learning in naturalistic settings’ (Looi and Seow 2015, p.420).

2.2.2.2.3. Collaborative learning

Like seamless learning, collaborative learning is a characteristic of mobile learning that offers the possibility of supporting deeper learning. Collaborative learning encourages dialogue, critique, sharing of ideas and opinions, problem solving, filling the gaps in one’s knowledge base, clarifying misconstrued conceptions and constructing new knowledge or meaning. Online collaborative learning can offer greater learning opportunities than traditional collaborative face-to-face classroom learning activities. Within the reviewed research, online collaborative learning through microblogging in Ebner et al.’s (2010) research recorded that 60% of the eleven thousand participants’ posts consisted of reply posts involving student conversations between peers and teachers. Stephansen and

Couldry (2014) acknowledged that Twitter extended collaborative learning beyond the traditional classroom, ‘regulated curriculum’ and beyond ‘institutionally defined relationships’ (p.1224). Carpenter and Krutka (2014) reported that educators valued Twitter’s facilitation of synchronous and asynchronous online collaborative learning for supporting professional development to ‘question and react to people and ideas’ whenever and wherever needed (p.426). Krutka et al. (2014) reported that contributions from peers was identified as the most meaningful interaction on Edmodo. This research also noted that although research participants recorded that they had no issue in relation to disagreeing with their peers’ opinions or strategies, in reality analysis of data indicated that they rarely did. Junco et al. (2013) research noted that an experiment group, who were given free reign in their Twitter activities, engaged in high levels of collaborative learning. Ebner et al. (2010) recorded that participants involved in high levels of collaborative communication through microblogging experienced positive perceptions of ‘the potential of new media’ (p.98). This finding dovetailed with results from Lee (2009) which identified that collaborative learning created a positive outcome for an individual blogger: ‘When someone visits my hompy and replies to my journal, I feel positive forces and very encouraged’ (p.105). On the other hand findings from Junco et al. (2013) established that collaborative learning did not achieve learning outcomes as the pedagogy did not support online collaborative learning. It noted that ‘The design of teaching strategies and practices related to virtual engagement and collaboration is instrumental to achieving positive educational outcomes’ (p.285). From my evaluation of the reviewed research from Junco et al.’s (2013) research, in particular study two, teachers did not seem to actively engage, evaluate or critique their student’s tweets, posts or blogs. It was evident that if online collaborative learning was to support deeper learning, customised and targeted pedagogical strategies such as feedback was necessary. In this research, my intention was to support online collaborative learning through the following pedagogical strategies:

- Present a clear outline of learning objectives and homework assignments verbally in class and textually online via Edmodo
- Regular monitoring of students’ online posts
- Scaffold students’ learning through regular and prompt feedback on their posts

I anticipated that these pedagogical strategies would promote both safe and disruptive learning within this research.

2.2.2.2.4. Safe and disruptive learning

The reviewed research provided examples of both safe and disruptive learning. Stead (2006) argued that the learning aspect of mobile learning involved both safe learning and disruptive learning. Safe learning is viewed as mobile devices and platforms offering ‘access to learning resources in common learning contexts’ (Koszalka and Ntloedibe-Kuswani 2010, p.142). Safe learning therefore implies cognitive learning. In contrast, disruptive learning involves immersive, innovative, learner-centred, critical reflection and collaborative learning outside the framework of the conventional learning context. Disruptive learning therefore involves deeper learning. Overall the reviewed research centred on the use of mobile microblogging for safe learning through the use of technology to deliver information to learners and teachers. In contrast, Lee (2009) supported disruptive learning through the use of Cyworld blogs as an ‘important tool in the practice of self-cultivation’ that involved critical self-reflection among Buddhist priests (p.113). Within this research, I planned to support safe learning by delivering information on the various images of God from the Junior Certificate module ‘Images of God’ as well as supporting students’ presentation of their own personalised images of God within Edmodo. I also expected to support a disruptive learning experience where students would collaboratively discuss and reflect on their own personal image of God with peers through Edmodo. This planned disruptive learning activity relates to Grimmitt’s (1987) ‘learning from religion’ that promotes deeper, reflective personalised learning. In summary, evidence from the reviewed research indicated that mobile microblogging and blogging could potentially support deeper learning through social networks, reflection, seamless learning, collaborative learning, safe and disruptive learning.

2.2.2.3. The microblogger

The reviewed research found evidence that some users of microblogs, namely microbloggers, actively engaged on platforms while others chose to observe or lurk online. The majority of microbloggers within the reviewed research engaged actively and

enthusiastically. Carpenter and Krutka (2014) found that 84% of microbloggers used Twitter on a daily basis while 49% used it several times a day. Mauroux et al.'s (2014) research on the employment of mobile online learning journals within work experience identified that some microbloggers had minimal engagement online. This finding in the reviewed research resonates with the Dennen (2008) and Klemm (1998) definition of online participants who choose to have minimal engagement online lurkers who read other user's' posts but do 'not contribute in any noticeable way' to online dialogues (Dennen 2008, p.1624). Lee (2009) revealed that several Buddhist nuns and priests chose to lurk as they felt blogging was no longer a private matter but a 'public relations material for image making' (p.108). As a result of these findings, I appreciated that some of the participating students within this research could choose to engage in smartphone microblogging as passive lurkers. Active online communication and conversations can be an effective means for enhancing deeper learning. I therefore planned to create a safe and inclusive online learning community where students feel comfortable in actively participating on Edmodo.

2.2.2.4. SAMR

Technology like Edmodo can enhance and transform learning from the delivery of objective information to the creation of personalised knowledge. It can facilitate the development of surface learning to deeper learning and safe learning to disruptive learning. Evidence from the reviewed research confirmed that microblogs and blogs enhanced and, on occasion, transformed learning as defined in the Substitution Augmentation Modification Redefinition (SAMR) model. SAMR provides a lens for the integration of technology involving four stages: substitution, augmentation, modification and redefinition (Puentedura 2013) (See appendix D).

Firstly, the enhancement of learning within the SAMR model involves the substitution and augmentation stages. The substitution state entails substituting technology for a learning task which could be completed without technology. For example, Cheong et al. (2008) research found that Christian blogs were used for delivering information on the Christian worldview regarding current issues. This information could have been disseminated just as effectively in a Church newsletter or verbally from the altar. SAMR's

augmentation stage offers technological improvement for learning tasks and processes which would not be possible in the absence of technology. Within the reviewed research, microblogs' and blogs' multimedia affordances strengthened and sustained cognitive learning in ways text-based textbooks could not (See paragraph 2.2.2.1. and 2.2.2.3.). I appreciated that the enhancement of learning through SAMR's substitution and augmentation stages related to the use of technology to support lower order thinking skills such as remembering, understanding and applying as outlined in Bloom's reviewed taxonomy (Anderson et al. 2001). Within the reviewed research, examples of microblogs and blogs supporting cognitive learning's lower order thinking skills was evident through their delivery of information and multimedia affordances (See paragraph 2.2.2.1.1. and 2.2.2.1.3.). Within the remit of this research, I understood cognitive learning within Religious Education to entail the process of remembering, understanding and applying factual information, what Grimmit (1987) defines as 'learning about religion'. Consequently, I intended to use smartphone microblogging to support 'learning about religion' through online and mobile delivery and receipt of facts, supported by Edmodo's multimedia communication channels.

Secondly, the transformation of learning within the SAMR model implicating the modification and redefinition stages was evident to a lesser extent in the reviewed research. The modification stage significantly changes learning tasks and processes in ways which would not be possible without technology. For example, the reviewed research identified that mobile microblogs and blogs supported a redesign of learning through their support of 'always on' collaborative and seamless learning anytime, anywhere and with anyone (See paragraph 2.2.2.2.). The redefinition stage employs technology in creating totally novel and innovative learning tasks and processes not feasible without technology. I would argue that there was no strong evidence of redefinition, within the reviewed research on mobile microblogging in relation to deep learning through critical reflection. Evidence from the reviewed research indicated that reflection was often reduced to surface descriptions. Critical reflection, as advocated in the redefinition stage, relates to the higher order skills using analysis, evaluation and creation as outlined in Bloom's reviewed taxonomy (Anderson et al. 2001). Evidence of these skills, promoting deeper learning, was scarce within the reviewed research. I

believed this may have been due to the dearth of pedagogical guidance and support on attainment of, or engagement with these higher order skills. Consequently, I planned to use pedagogical strategies within this research that incorporated my scaffolding of students' deeper learning and reflection through regular monitoring and feedback. I therefore prepared to employ smartphone microblogging that transcends the 'mundane forms of communication and information retrieval' (Buckingham 2008, p.14).

As a result of this literature review, I planned to perform the following specific tasks to ensure smartphone microblogging was perceived as a valuable educational tool for supporting the learner aspect of mobile learning:

- Direct and prompt regular and robust feedback through my posting of comments, replies and questions on Edmodo.
- Employ Edmodo's multimedia visual and textual channels for communicating and discussing students' unique images of God.
- Encourage students' reflection-in-action and reflection-on-action through planned learning activities, homework assignments feedback.
- Plan homework assignments that incorporate seamless learning.
- Support collaborative learning through homework assignments
- Encourage students to participate, collaborative learn and reflect online by creating a safe, positive and inclusive online culture within Edmodo
- Facilitate disruptive learning by planning deeper learning opportunities
- Continue to develop awareness, as the teacher-researcher of the contrasting learner types; active engagers and lurkers, within smartphone microblogging.

Through these specific tasks, I planned to encourage students to engage in 'learning about religion' by advancing the cognitive learning objectives outlined in the Junior Certificate Religious Education module 'Images of God'. I also hoped to promote 'learning from religion' within Edmodo through students collaborating, reflecting and creating new deeper personalised knowledge offering 'possibilities of meaning' (Sterne 1999, p.262). In short, in investigating the reviewed research on the learner aspect of mobile learning the following categories emerged:

- Cognitive learning relating to the delivery of information and feedback and the multimedia affordances of mobile microblogs and blogs

- Deeper learning implicating reflection, seamless learning, collaborative learning, safe and disruptive learning
- The microblogger and the lurker
- The SAMR model (Puentedura 2013)

The reviewed research identified that the learner aspect of mobile learning was interlinked to the social aspect of mobile learning.

2.2.3. The social aspect

The social aspect of mobile learning is comprised of ‘processes of social interaction and cooperation’ (Koole 2009, p.31). Within this examination of the reviewed research on the social aspect of mobile learning through microblogging, pedagogy and online learning communities emerged as key areas.

2.2.3.1. Pedagogy

Two of the ten reviewed research articles provided insight as to how pedagogy supported microblogging and blogging. These articles positioned pedagogy as an online social activity that involved regular monitoring and scaffolding of learning through frequent and apt feedback, questions and assessment. Junco et al. (2013) research used Chickering and Gamson’s (1987) seven principles of good practice in undergraduate education to guide pedagogical strategies and practices in the deployment of Twitter to support learning. Chickering and Gamson’s (1987) guiding pedagogical strategies and practices identified pedagogical contact with students, student co-operation, active learning, timely and apt feedback from educators, time management of learning tasks, application of high standards and appreciation of diversity as good practice. Mauroux et al. (2014) research discovered a correlation between satisfactory perception of the use of the mobile online learning journal and high level feedback from teachers. Ebner et al. (2010) focused on the employment of microblogging for documenting individual learning activities and learning processes and identified ‘a minimum of extrinsic input or coercion’ by the teacher (p.96). Ebner et al. (2010) identified a pedagogical shift in the role of the teacher within microblogs as a facilitator of self-directed learning rather than a supplier and dispenser of knowledge. By evaluating the reviewed research, I realised that pedagogy requires theory-lead strategies, online monitoring and prompt feedback through

questioning to support learning through microblogging. Berge and Muilenburg (2002) advocated the use of Bloom's reviewed taxonomy to produce the appropriate questions that 'foster learner engagement in the learning process' (p.184). I therefore planned to use Bloom's reviewed taxonomy in generating questions on 'Images of God' that support cognitive learning through lower order learning of factual knowledge and deeper learning through higher order learning of metacognitive knowledge (See appendix E). I envisioned that these examples of lower and higher order learning questions, centred on addressing the cognitive and deeper learning on 'Images of God' could provide effective feedback within smartphone microblogging's online learning community.

2.2.3.2. Online learning communities

The findings from the reviewed research relating to the social aspect of mobile learning discovered that mobile microblogging and blogging supported, sustained and strengthened online learning communities. Krutka et al. (2014) discovered that collaborative reflection on Edmodo encouraged a sense of collective purpose among peers through Edmodo's online community. Stephansen and Couldry (2014) recognised that Twitter built confidence among teachers and students through its 'shared space for dialogue that facilitated community' (p.1212). Stephansen and Couldry (2014) also viewed Twitter, not just as a network of connections based on similar interests but as a 'community of practice' where teachers and students constructed shared values and meanings (Wenger 1998). Ebner et al. (2010) argued that the strength of microblogging lay in its capacity to encourage constant collaborative online conversations that communicate, comment and critique within 'a murmuring community that is working on a specific problem without any restrictions of time and place' (p.98). The same research documented that 36% of posts were categorised as private 'small talk between students' or murmurings within its community (p.97). Carpenter and Krutka (2014) discovered that Twitter's social affordances helped combat feelings of isolation and promoted positive, creative, professional and valuable collaborative connections with fellow educators within its online learning community. Conversely, research conducted by Evans (2014) recorded that interpersonal relationships between tutors and students did not develop through Twitter's online learning community over a twelve week period.

The reviewed research highlighted evidence of blogs providing a space where users could discuss their social and spiritual lives in their research. Cheong et al. (2008) identified that bloggers used blogs to interface with, and assimilate into a religious community. This research viewed blogs as creating a space where individuals and communities could experience a ‘melding of the personal and the communal, the sacred and the profane’ (Cheong et al. 2008, p.107). Lee (2009) identified that the online community provided a place for bloggers to explore and practice spiritual self-cultivation or as Campbell (2005) defined as a ‘sacramental space...set apart for holy use’ (p.119). This research also found that blogs facilitated learning and feedback which helped priests strengthen ties to the online blogging community. One blogger noted in Lee (2009) that her blog supported a virtualized kinship, a private community that she labelled as ‘ilchon’, where she could control both her private space and online interaction with other Won and non-Won Buddhists:

Keeping an open journal allows earnest meeting with those visiting my blogs. And the journal can be my private space, an open space for ilchon, or a space even for non-ilchon, because I control the degree of openness. By sharing my private and secret place with others, I build a passage to deeply commune with them. (p.104)

This evidence from Lee (2009) and Cheong et al. (2008) reviewed research relates to the current third wave of research within digital religion that consists of ‘integrated spheres of interaction ...where individuals and groups live out their social and spiritual lives, and offline boundaries and relations often inform the online sphere’ (Campbell and Lövheim 2011, p.1083). The reviewed research on mobile microblogging and static deskbound blogging provided a rich insight into the social aspect of mobile learning; pedagogy and an online learning community. The reviewed research ascertained that the effective implementation of mobile microblogging supporting an online learning community necessitated pedagogical support. Pedagogical support of an online community employed regular and rigorous monitoring and feedback to support learning and theoretically driven strategies such as Chickering and Gamson’s (1987) seven principles of good practice in undergraduate education. Microblogs’ and blogs’ support of an online learning community was regarded by many research participants as positive for advancing learning, professional development, publically and privately improving links between religious communities and potential believers as well as for cultivating the spiritual self. As a result of this literature review, I planned to create a positive learning environment

within Edmodo to encourage an active online learning community by the regular and rigorous monitoring of students' posts. I also intended to provide feedback to individual students to support their learning. In addition to a comprehensive understanding of the device, learner and social aspects of mobile learning, this literature review investigated the research design of the reviewed research. This investigation ascertained which effective and efficient research methods could be employed in my research of smartphone microblogging for supporting mobile learning within post primary Religious Education.

2.2.4. Research design

Research design concerns the methodical and planned investigation into a research problem or research question. Research design therefore comprises a sample of research participants including timeframes, a systematic research methodology, research instruments, data collection and data analysis, limitations and recommendations for future researchers, educators and policy-makers. In investigating the research design relating to the reviewed research, convenience sampling, a mixed method approach, the research instrument based on Davis's (1989) Technology Acceptance Model (TAM) model and research limitations were identified as effective research practices.

The first effective research practice identified in the reviewed research was the use of convenience sampling. Convenience sampling was used in the majority of the selected empirical research as researchers invited participants who were 'willing and available to be studied' (Creswell 2012, p.145). The majority of the reviewed research used a small sample of voluntary students and teachers. An apparent drawback with small sample sizes is that findings cannot be generalised. However Mauroux et al. (2014) viewed a small sample size as beneficial, as all participants can voice their experience and opinions. The majority of the reviewed research was conducted over a short timeframe and related to a particular curriculum module within a particular academic course. Within this research, I planned to use convenience sampling by inviting all first year Religious Education students within a specific ETB post primary school to voluntarily participate in using Edmodo for supporting mobile learning on the Junior Certificate curriculum module 'Images of God' within a two week timeframe.

The second effective research practice identified in the reviewed research was the use of a mixed method approach. A mixed method approach was a popular research methodology employed in the reviewed research. This mixed method approach using quantitative and qualitative data collection, will provide a more complete and deeper understanding of the research question from multiple and divergent perspectives and therefore strengthen the accuracy and validity of the research (Creswell 2012; Creswell et al. 2011; Denscombe 2008). The majority of both quantitative and qualitative data collected within the reviewed research consisted of online surveys, online Likert scale questionnaires, pre and post-tests, semi-structured interviews and posts or tweets from microblogging or blogging platforms. Online data collection is an efficient method of data collection that could potentially lessen the discomfort of research participants who may be self-conscious about providing sensitive and personal information within a face-to-face interaction. For example, Krutka et al. (2014) used an online questionnaire focused on users' perceptions of online reflection using Edmodo. Mauroux et al. (2014) used a quantitative approach in collecting and analysing data from apprentices' mobile and online learning journal which included numerous pictures recipes, self-evaluation accounts and reports to supervisors. Two key areas emerged within the reviewed research in respect of data analysis. Quantitative data analysis consisted mainly of statistics such as calculation of sums, means and standard deviations (Evans 2014; Krutka et al. 2014; Hsu and Ching 2012). For example, Stephansen and Couldry (2014) measured the average monthly and weekly tweets, the most active users and hashtags from over four thousand five hundred tweets using a data analysis software package called NVivo. Carpenter and Krutka (2014) and Evans (2014) used SPSS, a data analysis software package, to help produce descriptive statistics. Junco et al. (2013) measured quantitative statistics between pre and post tests and used Leximancer software to help evaluate themes through the qualitative analysis of relational interactions and semantic or meaning-based tweets uploaded onto Twitter by research participants. Ebner et al. (2010) recorded the daily number of postings uploaded by research participants onto the microblogging platform MBlog. Hsu and Ching (2012) used quantitative data analysis of tweets from Twitter, students' perceptions regarding mobile microblogging and self-reporting on their Twitter usage. Mauroux et al. (2014) used a quantitative approach in analysing data from questionnaires to measure apprentices' acceptance of the smartphone,

the acceptance of the mobile and online learning journal and their perception of their work/learning environment. Qualitative data analysis largely involved thematic coding. For example, Stephansen and Couldry (2014) used codes from its quantitative data's: '@mentions, #hashtags and URLs, and identified the most active users and most frequently used hashtags as metrics or codes for qualitative analysis of data from one students' focus group and two staff interviews (p.1216). Carpenter and Krutka (2014) engaged in several cycles of coding for extracting categories from qualitative data. Qualitative analysis within Mauroux et al. (2014) and Junco et al. (2013) employed existing categories developed from previous literature. Mauroux et al. (2014) used individual semi-structured interviews for analysing data using thematic coding. Ebner et al.'s (2010) data analysis involved studying and categorising microblogging posts to see whether posts had a hyperlink, a tag, a reply to another post, a private message or contained administrative entries regarding the course subject and group work. Hsu and Ching (2012) analysed tweets through Corbin and Strauss's (1990) constant comparison coding method which involved the researchers constantly comparing data in order to classify themes through 'the process of breaking down, examining, comparing, conceptualizing, and categorizing data' (p.61). Following this qualitative coding to categorise tweets, Hsu and Ching (2012) employed quantitative analysis to measure the various categories of tweets from the data collected. Data analysis research instruments such as Spearman's correlations and SPSS chi-square cross tabulations were employed to calculate connections between variables. For example, Carpenter and Krutka (2014) research used chi-square cross tabulations to examine links between the characteristics of educators and their engagement with Twitter. As a result of this investigation of the reviewed research, I decided to use a mixed methods approach as I believed that this methodology is best suited to encapsulate the many complex realities of data collection and data analysis regarding the practice and perception of mobile learning.

The third effective research practice identified in the reviewed research was the use of the TAM model. The TAM model, developed by Davis (1989), was used as a research instrument within the reviewed research (Mauroux et al. 2014). Mobile learning is naturally situated within informal learning due to its portability, social interactivity, context and individuality affordances (Klopfer et al. 2002). Consequently, many

researchers discern that mobile learning is challenging to design, implement, research and evaluate (Ng and Nicholas 2013, Wang and Shen 2012, Hwang et al. 2011, Liaw et al. 2010). TAM is a research instrument that can evaluate or measure participants' perceptions of the usefulness and ease of use of a particular device or technology. Perceived usefulness addresses the degree to which a person believes that using a particular system would enhance his or her job performance' (Davis 1989, p.320). The perceived ease of use relates to 'the degree to which a person believes that using a particular system would be free from effort' (Davis et al. 1989, p.985). Perceived usefulness and perceived ease of use of technology influence attitude. This in turn, informs behavioural intention and therefore impacts on the actual use of the device or technology. Legris et al. (2003) argue that TAM's weakness lies in its exclusion of additional external variables. Previous research using TAM identified additional external variables such as self-efficacy (Wang et al. 2006), perceived value (Turel et al. 2007), perceived playfulness (Roca and Gagné 2008), perceived convenience in relation to time, place and execution (Yoon and Kim 2007) and personal demographics (Park et al. 2012). With particular reference to using TAM for measuring mobile learning technology, previous research external variables included personal innovativeness (Liu et al. 2010) and the perceived convenience concerning time (Chang et al. 2012). Mauroux et al. (2014) selected research used the TAM model for measuring the acceptance of the mobile and online learning journal, using the following external variables:

- 'positive attitude toward using technologies'
- 'motivational support'
- 'appropriate responses to changes'
- 'perceptions of the work environment'
- 'feedback/support/guidance'
- 'positive attitude toward reflection'
- 'perceived usefulness and ease of using the mobile and online learning journal'(p.220)

Mauroux et al. (2014) collected data through its TAM instrument using a questionnaire predicated on the above external variables. These questionnaires were given to research participants one month after the research was finished. I regarded the timing of this questionnaire as questionable as the experience of engaging in mobile online journal blogging may have been diluted or distorted over the time gap of a month. I planned to

collect data on the practice of smartphone microblogging through a TAM instrument using an online questionnaire and distribute these online questionnaires to students immediately after this research has finished.

Limitations that the researchers themselves identified within the reviewed research included no baseline comparison for data analysis, timing of data collection, failure to highlight specific instruments used for measuring reflection and one-sided data collection from either teachers or students. For example Carpenter and Krutka (2014) identified that their data collection over relied on data from participants' self-reporting. I have discovered through reviewing selected research that there are often discrepancies between what is perceived and the actual reality of what is produced. This opinion is confirmed in Mauroux et al. (2014) finding that participants' opinions and perspectives frequently differed from their actual use as 'an apprentice could say in the interview that he thinks the reflection on workplace experiences is useful for learning, but show no evidence of doing this' (p.227). As a result, I planned to collect both quantitative and qualitative data from students and myself as teacher-researcher in order to generate a more balanced and holistic picture of the experience and perception of employing Edmodo for supporting mobile learning within post primary Religious Education.

In conclusion, the reviewed research offered a well-informed, rigorous and reliable insight for researching how smartphone microblogging supports the device, learning and social aspect of mobile learning within post primary Religious Education. As a result of this insight I intended to conduct my research through the use of the following research strategies:

- Convenience sampling involving voluntary students within timetabled Religious Education first year classes.
- A mixed method approach implicating both quantitative and qualitative data collection and data analysis.
- The TAM model
- Quantitative and qualitative data collected from students and myself as teacher-researcher on our experiences and perceptions of using Edmodo

I identified limitations within the reviewed research, namely a limited insight into ethical and privacy considerations and a scarcity of learning theories for directing teaching and learning within microblogging and blogging. The issue of ethics was rarely addressed, an issue that is integral to data collection and data analysis. Only three out of the ten selected research articles identified underpinning learning theories for mobile microblogging. Without an appreciation of learning theories within pedagogical practice ‘learning may lead to mindless activism’ (Wang 2012, p.5). I would contend that a review of appropriate learning theories is vital for the effective and efficient implementation of mobile microblogging supporting mobile learning and teaching within post primary Religious Education.

2.3. Learning theories

Within the reviewed research Evans (2014), Hsu and Ching (2012) and Ebner et al. (2010) identified that mobile microblogging was rooted in social constructivism and connectivist learning theories. Identifying learning theories pertaining to microblogging is vital as they form the educational behaviour, skills, knowledge, attitudes, rationale, observable measures, roles, pedagogy and the teacher-learner relationship involved. Popper (2002) argues that learning theories are like ‘nets cast to catch what we call ‘the world’ (p.37). Ericsson and Wingkvist (2010) acknowledge that learning theories are vital for the systematic, rigorous and effective employment of mobile learning. Learning theories produce learner-centred learning that affects ‘active and reflective participants in their learning and assessment outcomes’ (DES 2012a, p.3). Presenting more than one learning theory for learners is prudent as a single learning theory cannot ‘accommodate the diverse student body’, their distinctive learning needs and learning experiences (Farren 2005,

p.57). Additionally, learning is not a sequential, linear process but rather a complex myriad of indiscriminate steps that takes place in real-life's 'crooked timber of humanity' as succinctly described by Kant (1784 cited in Procee 2006, p.240). Herro et al. (2013) suggests that a well-defined pedagogical plan for integrating the use of mobile devices supporting learning within schools is vital. Learning theories like behaviourism, cognitivism, constructivism, situated learning, problem-based learning, context awareness learning, socio-cultural theory, collaborative learning, conversational learning, lifelong learning, informal learning, activity theory, connectivism and location-based learning have been applied to mobile learning. Connectivism and social constructivism learning theories complement the communal experiential essence of Religious Education as well as the online collaborative and social element of mobile learning.

2.3.1. Connectivism

Learning is essentially about making connections. Learning happens through neurological, cognitive, social and experiential connections (Cross 1999). The brain's neurological development relates to the cognitive structure or schemata. Schemata generate meaningful information through relational connections which in turn produce knowledge. Educational theorists like Dewey and Piaget understood that cognitive learning which involved connections between schemata, involving past and present knowledge was actively and deliberately created, as opposed to being delivered and discovered. Connectivism formulates that learning happens through networks of connections or 'nodes' where information is communicated, consumed, created, accepted, validated, answered, rejected or exchanged. Connectivism nurtures a more participatory and personal cognitive learning experience (Downes 2006; Siemens 2005). It positions teachers to 'weave a complex web of connections among themselves, their subjects, and their students so that students can learn to weave a world for themselves' (Palmer 1998, p.11). Dewey (1930) recorded in his book *'Democracy and Education'* first published in 1916 that effective teaching 'bears in mind the desirability of affecting this interconnection', between classroom learning and learning beyond the classroom (p.192).

Connectivism is often criticised as a learning theory as it refutes the logic based knowledge processes of traditional learning theories such as behaviourism (Kop and Hill

2008). It represents however, a viable and valuable learning theory for supporting contemporary learning and pedagogy within our technology driven, information determined, locally and globally networked 'Connected Age' (Dahlstrom et al. 2013). Turkle (2011) recognises connectivism as an ideal theory for cognitive learning within digital social networks that connect people through infinite offline and online information connections. It can therefore potentially extend conventional formal learning to include open and accessible infrastructures, limitless resources, inclusive of all learners from diverse age groups, cultures and social backgrounds.

Connectivism places the learner at the locus of their own learning where they have the opportunity to pursue learning that is collective, continuous, active, relevant, meaningful and personal, self-driven and positioned within diverse learning contexts. It positions the teacher as a facilitator, designer and ICT technician assisting and guiding learners to make critical connections for advancing success in their personal and professional lives. Connectivism can potentially sustain and strengthen the teacher-student and peer-to-peer relationship through its support of dialectic learning beyond the confines of the classroom through digital connections in ways that traditional pen and paper, chalk and talk cannot. Smartphone microblogs is an ideal connectivist learning tool that supports low level cognitive surface learning as a delivery information instrument as well as high level or deep learning which is active, reflective, critiqued, assimilated and often personalised (See paragraph 2.2.2.2.). Evans (2014) recognised that theories like behaviourism, cognitivism and constructivism limited learning to an individualistic concept as knowledge is located with the individual learner. Connectivism positions knowledge beyond the individual, but with others through online connections as Stephenson (1998) aptly explains 'I store my knowledge in my friends' (p.3). Evans (2014) argues that connectivism is especially pertinent to young learners from the Net Generation who are connected to social media tools like mobile microblogs. I viewed connectivism as particularly apt to the objective of Religious Education which aimed to connect with religious communities' beliefs and practices through understanding, tolerance, respect and often faith. Social constructivist learning theory was also identified as a learning theory within the reviewed research.

2.3.2. Social constructivism

Like connectivism, social constructivism views knowledge construction as a social process that involves a dialectical relationship between the learner and their learning community. Knowledge is therefore continuously changing due to the constant nature of people's participation within social environments. Koole (2009) established that the FRAME model 'relies very heavily upon the philosophy of social constructivism' (p.36). The religious educator Grimmitt (1983) views knowledge as 'socially constructed, socially related and socially relative' (p.20). Additionally Deulen (2013) argues for the use of social constructivism as a learning model for supporting online learning for Christian educators. Social constructivist epistemology claims that knowledge is not discovered but constructed and deconstructed through an individual's meaning-making activities. This knowledge construction is supported within a community or online network where 'individuals develop subjective meanings of their own personal experience, and that this gives way to multiple meanings' (Bloomberg and Volpe 2016, p.43). Social constructivist epistemology is based on Vygotsky's (1978) theory that learners' knowledge is actively constructed from their prior personal experience and interpretations of the world through a dialectical relationship between the learner and their social context through teacher, expert or peer assistance. Vygotsky's (1978) Zone of Proximal Development (ZPD) identifies the specific point where the learner independently and consciously constructs knowledge through scaffolding. Scaffolding involves peer or the teacher's clear direction, guiding and managing key tasks, solving learning problems, reflecting through clear direction, sharing information, encouraging through praise or focusing and challenging questioning. Through scaffolding a learner's understanding can potentially progress from a position 'what I can't do' to 'what I can do' (Vygotsky 1978). As a result of scaffolding based on Vygotsky's (1978) social constructivism a learner can contextualize information within their own unique personal context which can be applied as constructed personalised knowledge within practical real-world situations. This newly constructed personalised knowledge is called meaning making. Richey et al (2011) argue that meaning making lies at the heart of social constructivism. Although social constructivism can potentially promote deep learning like meaning making, I would argue that it fails to address the numerous factors that influence meaning making such as the learner's knowledge base, intellectual ability,

personality, motivation or unique social context. I maintained that this shortcoming could be tackled by the teacher's awareness of the unique factors that influence their students learning, by the teacher scaffolding students' learning and equipping students with educational tools appropriate for social constructivism.

Siemens (2005) argues that social constructivism is individualistic whereas connectivism is based on the premise that knowledge does not exist in the individual's mind but in the limitless connections to information resources including experts of knowledge available collectively in our world or 'global village' (McLuhan 1962, p.31). Within the reviewed research, Ebner et al. (2010) distinguished constructivism as the theory relating to microblogging's process-oriented learning. Additionally, Hsu and Ching (2012) identified that mobile microblogging's support of social learning was relevant to Vygotsky's sociocultural theory. Sociocultural theory views learners as constructing knowledge through cognitive connections within diverse social cultures, such as mobile microblog learning communities. Smartphone microblogging for supporting mobile learning employing connectivist and social constructivist learning theories changes the teacher's role. The teacher is no longer engaged in distributing information but is empowering learners by facilitating self-directed learning. Self-directed learning places the learner at the locus of control of their learning thus rejecting the hierarchical control of the teacher as the sole warden of knowledge as advocated within traditional pedagogy. Ebner et al. (2010) maintain that the role of the teacher in the use of microblogs, is to facilitate learning through planning and practicing instructional design. I planned to use an instructional design that supports online learning conditions like prompt and personalised feedback, 'knowledge acquisition...and new learning approach and communication tools' (Kyndt et al. 2009, p. 381), underpinned by both connectivist and social constructivist learning theories.

2.4. Summary

This literature review provided a clear roadmap on best practice for teachers and learners engaged in microblogging or blogging along with relevant pedagogies. The first half of this review involved my examination and evaluation of empirical literature on microblogging and blogging within diverse educational and religious community settings. This literature review was a successful reconnaissance or fact finding mission that informed my teaching practice in supporting students' mobile learning through smartphone microblogging. Key findings in the literature review signposted a well-defined plan for me as a teacher-researcher in the planning, acting, observing and reflecting stages of this PAR research including the collection and analysis of data. Key findings regarding the device aspect revealed participants recorded a positive experience in their use of mobile microblogging and blogging. Key findings pertaining to the learner aspect revealed that mobile microblogging and blogging supported cognitive learning and deep learning through their multimedia affordances and seamless learning, collaborative learning and reflection through the teacher's monitoring and scaffolding of learners. Key findings concerning the social aspect established that microblogging and blogging could sustain and support online learning communities beyond the conventional context of the formal classroom or the offline religious community. The social aspect also addressed the pedagogy supporting microblogging and blogging which is underpinned by the connectivist and social constructivist learning theories. Key findings related to research design from the reviewed research concluded that using convenience sampling, practising a mixed methods approach and employing the TAM research instrument for measuring perceptions around mobile microblogging was effective. Findings from this literature review provided a rich insight and well-defined plan for the research design. The second half of this review presented connectivism and social constructivism as relevant learning theories to underpin my pedagogy facilitating smartphone microblogging to support mobile learning within post primary Religious Education. Chapter three will present the research design.

Chapter 3: The acting and observing stage: Research Design

3.1. Introduction

The aim of this chapter is to outline the structured framework in which the research design is accommodated. The research design comprises pragmatic philosophical underpinnings, PAR methodology and a mixed method approach, as summarised in Figure 3.1.:

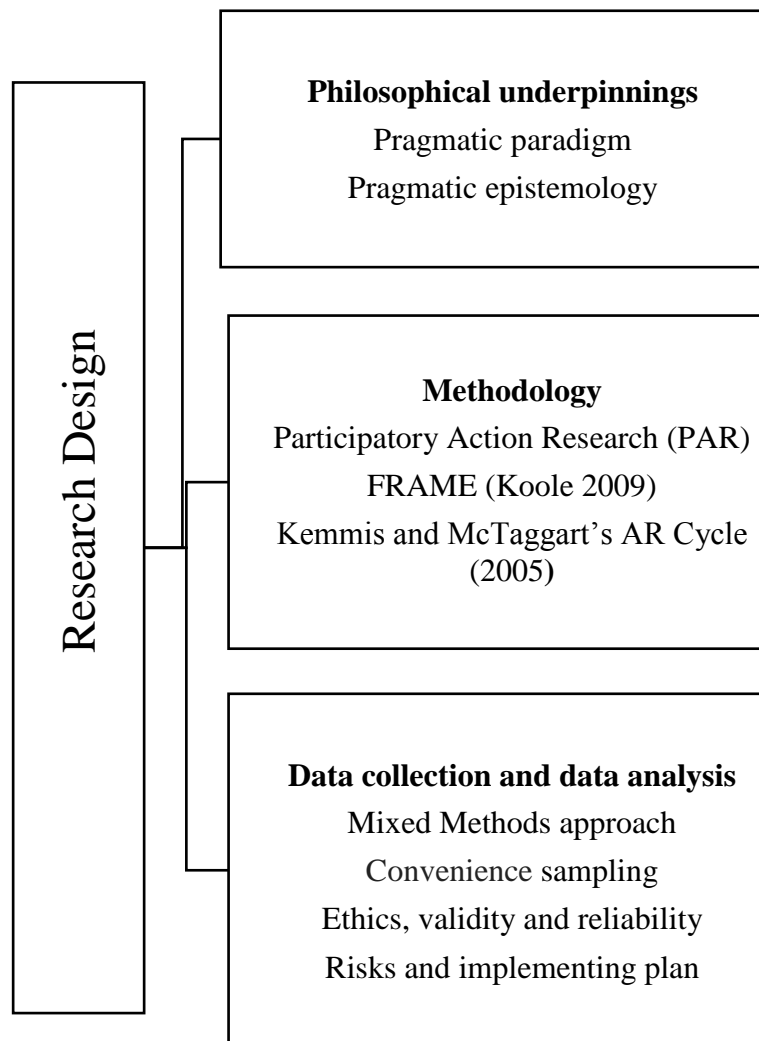


Figure 3.1.: Research design on smartphone microblogging supporting the device, learner and social aspects of mobile learning in post primary Religious Education

The philosophical principles underpinning the research design are positioned within a paradigm based on pragmatic ontological and epistemological assumptions.

3.2. Philosophical underpinnings

Philosophical underpinnings determine the expectations, values and propositions of particular social realities, worldviews or paradigms. Paradigms influence judgement, beliefs, principles, identities, behaviour and action. Consequently, paradigms constitute a fundamental component of research as they are ‘like a skin not a sweater: they cannot be put on and taken off whenever the researcher sees fit’ (Marsh and Furlong 2002, p.17). Educational research is embedded within numerous and diverse paradigms. A positivist paradigm embraces a scientific, systematic, objective, mechanical, unchanging, absolute and determined view of reality where facts exist independently from the learner. A positivist researcher is a distant outsider observing and investigating the phenomenon. A criticism of the positivist paradigm is that it rejects learners’ needs, perspectives and desires (Holbrook 1977; Kierkegaard 1974). On the opposite end of an imaginary paradigm spectrum is a post-positivist approach. A post-positivist paradigm rejects the positivist’s ‘abstraction of reality’ (Cohen et al. 2011, p.34). A post-positivist paradigm views reality as reliant on, immersed in and created by an individual’s own unique frame of reference, relativist experiences and environment. A post-positivist researcher’s investigations are informed by the individual’s experience and knowledge.

This research is positioned within a pragmatic paradigm. A pragmatic paradigm is essentially a practice-driven model that focuses on the researcher’s investigation into the ‘what’ and ‘how’ of a specific human experience (Morgan 2014; Hammond 2010; Denscombe 2008). Criticism of pragmatism stems from its lack of input into the traditional philosophical metaphysical debate over the nature of reality and truth ‘as pragmatists tell us nothing about their ontology or epistemology’ (Lincoln 2010, p.7). In contrast, Dewey argues that researchers need to move beyond this traditional philosophical metaphysical debate. Within this pragmatic paradigm, we; the students and myself as teacher-researcher, position ourselves as a community of post-positivist researchers investigating ‘What were our experiences of smartphone microblogging supporting mobile learning on ‘Images of God?’ This pragmatic paradigm correlates to Dewey’s (1938) concept of inquiry. This concept appreciates research as a self-conscious reflective process of attitudes and actions in practice. Furthermore, Dewey (1938) argues

that inquiry can resolve problems or answer questions through knowledge gleaned from within an individual's learning experiences. Consequently, this research, embedded within a pragmatic paradigm, is not committed to calculating a prediction or advocating an ideology, nor engaged in a deductive approach to prove or disprove, confirm or reject the FRAME model (Koole 2009). Instead this research will use this FRAME model as a lens or filter to identify the independent and essential elements of mobile learning to focus 'on what works' within this research (Tashakkori and Teddlie 2003, p.713). This research focuses on generating knowledge from our experiences of action, namely smartphone microblogging, its consequences and its values to teaching and learning. This pragmatic paradigm is based on pragmatic epistemology assumptions.

3.3. Epistemology

Epistemology or the study of knowledge, or 'how what is assumed to exist is known' (Blaikie 2000, p.8). Pragmatic epistemology understands knowledge as the practical consequences of an action. It views knowledge as rooted within human experience and contexts that are constantly fluctuating and fallible (Baert 2005; Rorty 1991). This pragmatic epistemology is inclusive of numerous truths on the inquiry into the real-world practicalities and active experience of practicing smartphone microblogging. Furthermore, it views knowledge as a product of social connected and constructed learning that recognises 'the existence of the plurality of knowledge in a variety of institutions and locations' (Kesby et al. 2007, p.9). This research on smartphone microblogging therefore positions knowledge as a socially connected process that 'is collaborative with meaning negotiated from multiple aspects' (Smith and Ragan 1999, p.15). This pragmatic epistemology complements my pedagogical approach which is underpinned by connectivist and social constructivist learning theories that understood knowledge as socially connected and constructed, 'not some individual possession but rather a common fund' (Lonergan 1972, p.43). Pragmatic epistemology is therefore compatible to this PAR methodology.

3.4. Methodology

The PAR methodology emerged in 1970s among educators like Fals Borda (1982) Freire (1970) and Rapoport (1970). These educators believed in shared power among research participants. Foucault (1980) identified power as based in subjective relationships rather than an objective phenomenon. I understand that PAR potentially balances the power relationship between co-researchers as it empowers them to equally and collectively connect with, construct, critique and share each other's knowledge. Within this research we adopted the PAR methodology by engaging as a 'community of researchers' pursuing a more inclusive, active and democratic process where 'We explore'. This process is in contrast to the top-down hierarchical traditional researcher 'I ask ... You answer' (Wadsworth 2001, p.78). PAR immerses and engages participating co-researchers in the research process as opposed to the traditional researcher who take a somewhat distant 'armchair view'. Lewin, the father of AR, maintained that people were more likely to experiment with innovative learning practice when they actively participate in the process.

I believe that PAR is well-matched to this research framework constituting the smartphone microblogging process, the Edmodo app, my pedagogical vision, post primary Religious Education and the post-modernist context. The PAR and smartphone microblogging process encompass the common elements of participation, action, democracy, transparency and openness, usually resulting in the improvement or growth of individuals or communities (Reason and Bradbury 2008). Additionally, the smartphone microblogging app Edmodo is the ideal PAR platform to facilitate open, transparent and active participation, consumption of information and the creation of knowledge. The PAR methodology reflects my pedagogical values which position students as active participating learners. It also facilitates my pedagogical vision of attaining a learning experience that is not a separate individual experience but a 'collective aspiration... where people are continually learning how to learn together' (Senge 1990, p.3). PAR complements the aim of post primary Religious Education as both exercise mutual attributes such as complex realities, collaborative participation, reflection, knowledge in action towards achieving something more positive and hopeful for an individual or inclusive society and creating communities of practice that value 'knowledge is a living

evolving process of coming to know what is rooted in everyday experience; it is a verb rather than a noun' (Coghlan 2008, p.214). Furthermore, the post-modernist context of this research advocates the participative nature of learning, comprising the collaborative practice where people 'learn with and from each other' as underpinned in the learning affordances of mobile learning and AR methodologies (Dillon 2013, p.73).

PAR is rooted in AR, a systematic, problem-focused, practical, theory generating, critical and self-critical process of enquiry designed to understand, improve, reform, transform, emancipate social knowledge, personal and professional practice and performance (Coghlan and Brannick 2014; Mc Niff and Whitehead 2011; O'Grady 2010; Mc Intyre 2008; Winter and Munn-Giddings 2001; Mc Niff et al. 1996; Elliott 1991; Carr and Kemmis 1986). In *'Democracy and Education'* Dewey (1930) justified educational action research through new practice or experimental action that tests, transfers and transforms knowledge, 'not mere opinion...the method of both discovery and proof' (p.393). Critics of AR question its validity as a research methodology, arguing that it is naive, ad hoc, unreliable, illusive, 'entirely personal and full of bias' (Denzin and Lincoln 1994, p.4) Rahman (1993) rejects AR as a research methodology regarding it instead as an organic element of an individual's self-development. I would agree with Rahman in that AR offers an opportunity to improve my teaching practice that may offer self-development and transformation. I however disagree with Rahman's (1993) view that AR is an organic, spontaneous and unplanned process. It is a conscious, systematic, planned process that embraces distinct methodology, epistemology, sets of values, stages of implementation and sampling (Cohen et al. 2011; Mc Niff and Whitehead 2011).

3.5. Sampling

This research employed a convenient sampling. This sampling consisted of one hundred and five male and female first year students from five class groups timetabled for Religious Education.

3.6. PAR Stages of implementation

Although PAR has ‘no fixed formula for designing, practicing and implementing’ (McIntyre 2008, p.2), I employed Kemmis and McTaggart’s (2005) AR cycle on the basis that it provides me with a clear plan of the various stages within this research. Kemmis and McTaggart’s (2005) AR cycle consists of three stages; planning, acting and observing and finally reflecting.

The planning stage was predicated on a spirit of partnership and dialogue. Consultative meetings were organised with a diverse range of stakeholders; management, parents, Religious Education teachers, ICT technicians and my academic supervisors. On securing ethical approval from the Dublin City University research ethics committee, parents and guardians were contacted by way of a letter comprising a Plain Language Statement and an informed consent form (See appendix F, G, H). Students were invited to volunteer as participative researchers and were authorised through signed consent and assent forms (See appendix I). Drawing from insights gleaned from chapter two’s literature review, I audited the device aspect of mobile learning to assess the school broadband capability, smartphone ownership among students and broadband support at home. I identified that the school broadband could not support a class of over twenty six smartphone users. I therefore decided to plan Edmodo learning activities on homework assignments within this blended learning experience.

The acting and observing stage featured the delivery of a technical workshop to volunteer students to demonstrate the workings of the Edmodo app. Strategies were presented on responsible and safe use of online communications as advocated in the Junior Cycle employ ICT ethically as recommended in the literature review (See chapter 2). Within this workshop I also advocated responsible and safe use of the smartphone microblogging app Edmodo in compliance with the school’s code of behaviour, ‘Think B4Uclick’ (http://www.thinkb4uclick.ie/wpcontent/uploads/2013/11/TB4UC_CLASS_10.pdf) and the Webwise Charter of Online Rights of the Child (http://www.thinkb4uclick.ie/wpcontent/uploads/2013/11/TB4UC_WEBWISE_CRC.pdf). This workshop took place in the initial class where students were supplied with a code to sign up to Edmodo. They were given a choice to either complete a pre-research

questionnaire and a pre-research survey online through Edmodo or in paper form (See appendix J, K). Students were then asked to create, upload and communicate their own personal image of God by textual post reinforced by a visual. Visuals consisted of individually drawn pictures which were then photographed by the students, photographs taken by students from their own real life environments or images taken from the internet using students' own smartphones. The visuals were uploaded and discussed online on Edmodo as homework assignments. In class I presented the module 'Images of God' from the Junior Certificate post primary Religious Education syllabus, verbally and visually through a PowerPoint. This PowerPoint was subsequently uploaded on to students' Edmodo accounts and discussed within class groups on Edmodo as a homework assignment. Students were asked to complete a post-research questionnaire on Edmodo (See appendix L).

The reflection stage involved an invitation to students to express, explain and examine the initial image of God they had posted onto Edmodo and to compare these images with those of their peers on Edmodo. I then asked students to create, upload and communicate a second personal image of God. Some students presented a similar image to their initial image of God while other students reviewed their image. Students completed a post-research survey, recording their experience and perceptions of Edmodo supporting mobile learning of the 'Images of God' (See appendix M). Focus group interviews provided an opportunity for some students to reflect over their experiences and voice these reflections. Finally the process of analysing data collected offered me an opportunity to reflect over our experiences. Table 3.1. summarises these three stages, timeframe and practices of AR Cycle:

<i>PAR Stages & Timeframe</i>	<i>Practices</i>
Planning: September 2013- January 2015	<ol style="list-style-type: none"> 1. Review of first AR cycle (Morrison-Reilly 2013) 2. Literature review 3. Consultative meetings with stakeholders 4. Inventory of ICT equipment and religious background 5. Ethic approval from DCU 6. Consent and assent forms signed by parents/guardians and students
Acting and observing: January 2015-March 2015	<ol style="list-style-type: none"> 1. Technical workshops (Classroom activity) 2. Pre-questionnaire and pre-survey (Homework assignment) 3. Students presenting and creating their first personal image of God on Edmodo (Classroom activity and homework assignment) 5. Teacher presentation of 'Images of God' (Classroom activity) 6. Discussing 'Images of God' (Classroom activity and homework assignment) 7. Post-questionnaire (Homework assignment)
Reflecting: October 2015- March 2016	<ol style="list-style-type: none"> 1. Student reflect and discuss their initial image of God they posted and their peers images of God (Classroom activity and homework assignment) 2. Students creating and presenting the second personal image of God (Homework assignment) 3. Post-survey (Homework assignment) 4. Focus groups 5. Data collected and analysed

Table 3.1.: Stages, timeframe and practices of AR Cycle
Source: Adapted from Kemmis and McTaggart's AR Cycle (2005)

Although Table 3.1. presents the AR stages, timeframes and practices as following a distinct, linear and sequential pattern, in reality I encountered the AR process as a fluid, flexible, open, reactive and 'fundamentally nonlinear' procedure involving 'to-ing and fro-ing' between stages and resulting in the chaotic, confusing, challenging reality of research' (Marshall and Rossman 2011, p.55). For example, the initial planned timeframe for the acting and observing AR stage for each class group was two weeks. However, due to class timetabling issues, the timeframe varied between two and three weeks. These AR stages of implementation were supported by my pedagogy.

3.7. Pedagogy

Pedagogy is pivotal to quality online learning. A clearly defined pedagogical process was especially advisable within this research as the collaborative nature of PAR presents particular challenges (Reason 1994). Taking the foregoing into account, and drawing on the literature review which provided a limited insight into pedagogy supporting mobile microblogging, I decided to use Salmon's (2003) popular five-stage scaffolding model. Figure 3.2. outlines the five stage plan for this research adapted from Salmon's (2003) model:

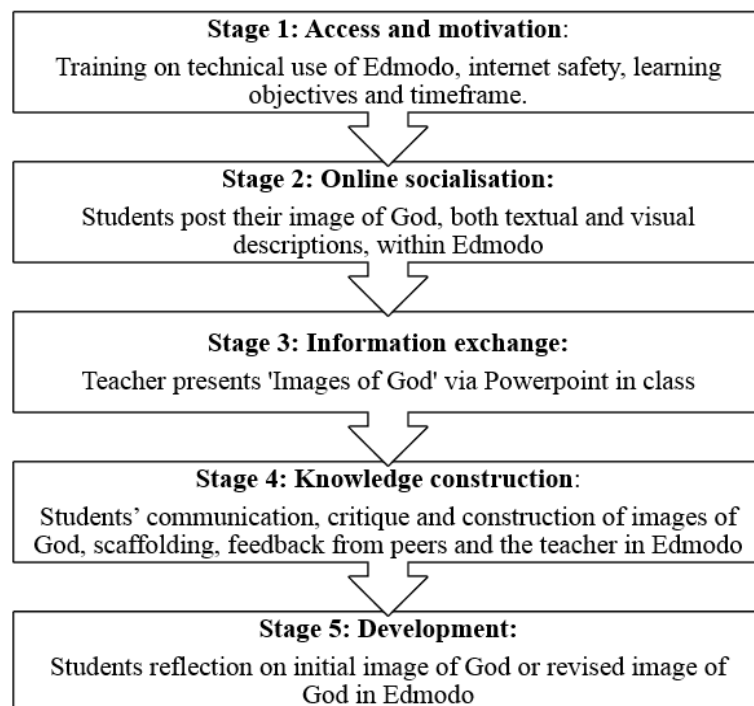


Figure 3.2.: The five stage plan
Source: Adapted from Salmon's scaffolding model (2003)

I employed Salmon's (2003) model during the first AR cycle (Morrison-Reilly 2013). I discovered that this model provided a clear-cut step by step guide for directing my pedagogy. I therefore decided to employ this pedagogy model in this second AR cycle as it was fit for purpose. The five stage plan guided me through the various steps in supporting students' smartphone microblogging.

3.8. Ethics

The ethics were influenced by my pedagogical values. These values are based on encouraging, engaging and empowering first year Religious Education students to voice their diverse perceptions, experiences, realities and knowledge of 'Images of God' through smartphone microblogging. Although my values uphold relativism, I used an objective ethical approach to avoid the inherent pitfalls of ethical relativism. This approach was considered prudent in the context of this PAR research which positioned me as a participating insider teacher-researcher and ethical gatekeeper. I appreciate that an ethical tapestry is interwoven through all stages of this PAR research. As ethical gatekeeper it was incumbent on me to speak comprehensibly, truthfully, authentically and appropriately at all stages of this PAR research (Habermas 1976). As ethical gatekeeper, I had, therefore, to be cognisant of any pre-conceived assumptions or bias within my professional practice. I was also mindful of the delicate balancing act required in respect of my relationship as teacher and insider researcher with students as co-researchers and how this relationship should not digress into 'unequal power relationships with the adult researcher' (Einarsdottir 2007, p.204). I assumed the reflective critique role in order to generate a more balanced power relationship based on ethical transparency, trust and professionalism. This reflective critique role facilitated my awareness of, and sensitivity to, the voices, experiences, perceptions, challenges and needs of students within the research. Permeating the data with a 'student voice' generated a more balanced power relationship within the research. Consent and assent letters detailed confidentiality, anonymity, the right of withdrawal at any stage and the educational benefits and risks of the research to the stakeholders who included the student, their parents/guardians and the school management. This research followed the ethical guidelines outlined in '*Guidance for developing ethical research projects involving children*' (Department of Children and Youth Affairs 2012). A pastoral care team consisting of a class tutor, year head, home-

liaison officer and two guidance counsellors were available to support students in the event of the materialisation of any adverse or unexpected outcomes.

The use of smartphone microblogging presented additional ethical issues such as the management of a safe online learning environment (Carrigan and Kirkup 2001; Sixsmith and Murray 2001). I reflected on recommendations outlined by the Association of Internet Research (AoIR) in relation to this research. The password secured smartphone microblogging app Edmodo was deployed. Edmodo facilitated safe learning in a ‘private living room’ rather than a ‘public square’ (Hudson and Bruckman 2004, p.128). The use of Edmodo minimised ethical concerns associated with mobile learning research within and beyond the classroom context on issues such as privacy, data protection, the risk of cyberbullying, archiving and sharing information (Aubusson et al. 2009). These risks were mitigated by the formulation of clear guidance in regard to the safe, responsible and ethical use of Edmodo, smartphones and the internet in the course of a planned workshop. These guidelines dovetail with the objectives of the Junior Cycle which encourages students to develop ICT skills that ‘uses technology and digital media tools to learn, communicate, work and think collaboratively and creatively in a responsible and ethical manner’ (DES 2015b p.12). This workshop highlighted to students the importance of ethical responsibility in safe internet usage from a position of ‘a positive ethic of inclusion and personal responsibility’ (Dyson et al. 2013, p.406). This position is in line with recommendations from the ‘Net Children Go Mobile: Full findings from Ireland’ (2015) report which advises that internet safety should not be addressed using ‘don’t do’ lists’ (p.76). Guidance and training on ‘using ICT safely and ethically’ is recognised as a key skill in the Junior Cycle (NCCA 2011, p.20). I drew up a risk management strategy resulting in risks and implementing plans to ensure safe and responsible use of Edmodo and accessibility to smartphones and Wi-Fi within the research as detailed in Table 3.2.:

Risk identified	Plans to address risk
Students who have no smartphone	Students will have access to a smartphone during lunchtime
Students who have no Wi-Fi at home	Student will be provided with Wi-Fi access at school
Students who upload inappropriate content on Edmodo	I can disapprove content before it is uploaded onto Edmodo
Student uploads their video or other students video onto You Tube	Students are asked to monitor each other's activities and to follow the code of behavior as outlined in the school's code of behaviour. If student has broken the school's code of behavior, the matter will be dealt with according to the school's disciplinary strategy.

*Table 3.2.: Risks and implementing plans
Source: School journal and ETB guidelines*

Within the research two volunteer students identified themselves as not having a smartphone or access to Wi-Fi at home. These students were each given a smartphone and access to Wi-Fi at school.

3.9. Validity and reliability

Ethics integrate seamlessly with validity and reliability. Validity refers to 'how logical, how truthful, how robust, how sound, how reasonable, how meaningful and how useful' the research is (Quinlan 2011, p.307). Reliability relates to the dependability of the research, evidenced by the soundness and conformability of the methodology, data collection and data analysis. Additionally, reliability concerns the expertise of knowledge of the specific area researched that allows the research to be repeated again (Cohen et al. 2011; Tashakkori and Teddlie 2011). I appreciate that validity and reliability were particularly significant in my multiple capacities as sole inside teacher-researcher, teaching member of the school where this research is based and Religious Education teacher to two of the five classes involved. I therefore adopted an audit approach whereby important decisions, insights and knowledge development throughout the process were recorded, clarified, rationalised and reflected upon through my researcher's journal as advised by Bowen (2009). Validity and reliability were further strengthened through validation meetings with peers on the Doctorate course, the supervisors who critiqued my research processes, practices and purpose within this research and unbiased feedback

from teachers and researchers at lectures and conferences at which I presented. As an insider teacher-researcher I regarded my role as advantageous as it allowed me to act and observe as ‘a native inhabitant of the research site...an observant participant who knows the research context in its richest sense’ (Cochran-Smith and Lytle 1993, p.58). On the other hand, I was aware that my insider research role presented potential challenges through the risk of students’ distorting their responses in focus groups, surveys and questionnaires to give what they deemed was the ‘correct’ answer. I addressed this issue by explaining to the students that their role as co-researchers empowered them with a voice that could give no wrong answers. Furthermore, a transcript of the focus groups was given to each participant to ensure accuracy in accordance with ethical guidelines as recommended by Krutka et al. (2014). Ethical considerations, based on democratic and inclusive values, underpinned this PAR research methodology and were especially imperative in regard to data collection.

3.10. Data collection

This research adopted a mixed method approach which complemented its pragmatic paradigm, ontology, epistemology and PAR methodology (Denzin 2015; Tashakkori and Teddlie 2003, Greene et al. 1989). Ivankova (2015) claims that AR and the mixed method approach have ‘common features’ that advocate a systematic, pragmatic, reflective and collaborative approach to research (p.52). Christ (2010) argues that AR and mixed methods have similar philosophical underpinning, methodology and research design. He identifies AR as a ‘form of mixed methods research’ (Christ 2010, p.293). This mixed method approach encompassed active online dialogue inclusive of multiple, diverse realities and truths between the co-researchers to build ‘a rigorous, cohesive set of conclusions’ for addressing the research question (James et al. 2008, p.81). This approach strengthened the validity of results through triangulation that may reduce ‘mono-method and mono-operational bias’ (Heppner et al. 2008, p.381). It also assisted with credibility, transferability, dependability and confirmability through in-depth valid information and high quality balanced data collection and analysis, thus ensuring ‘academic rigour’ (Lincoln and Guba 1985, p.328). All data collection sources, namely pre and post-research questionnaires and research surveys and focus group questions, featured multiple interpretations and constructions of realities from co-researching students. All sources

were planned, tested and piloted to ensure rigour, validity, credibility, transferability, dependability and confirmability (Corbin and Strauss 2008; Lincoln and Guba 1985). Seilhamer et al.'s (2013) four phased mobile implementation framework ensured clarity, readability, suitability, appropriateness, legitimacy and workability for students as Figure 3.3. outlines:

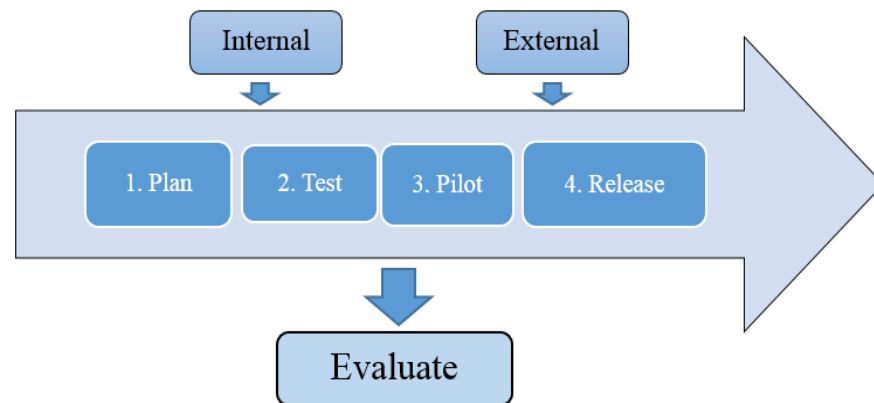


Figure 3.3.: Mobile Implementation Framework
Source: Adapted from Seilhamer et al.'s (2013) four phased mobile implementation framework

Piloting of data sources, specifically pre and post questionnaires and surveys, identified that the use of Likert scales was too challenging for a significant cohort of SEN students. Consequently, questionnaires and surveys were reviewed to include clear-cut yes and no questions together with questions that allowed students to select relevant answers from a range of options. Figure 3.4. outlines a timeline of the various quantitative and qualitative data collection sources positioned within the three stages of this PAR research:

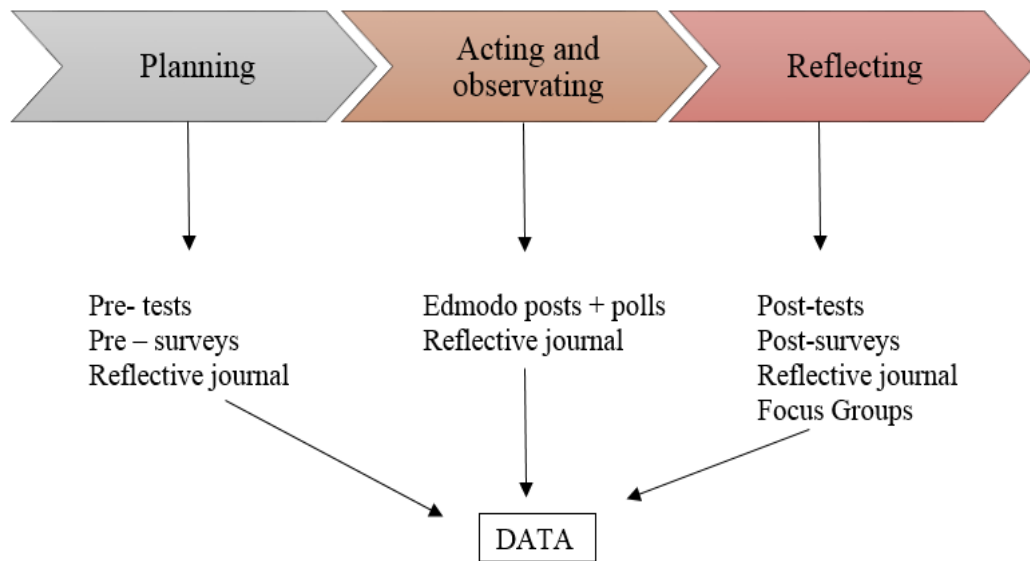


Figure 3.4.:Timeline of data collection sources positioned within the three stages of this PAR research

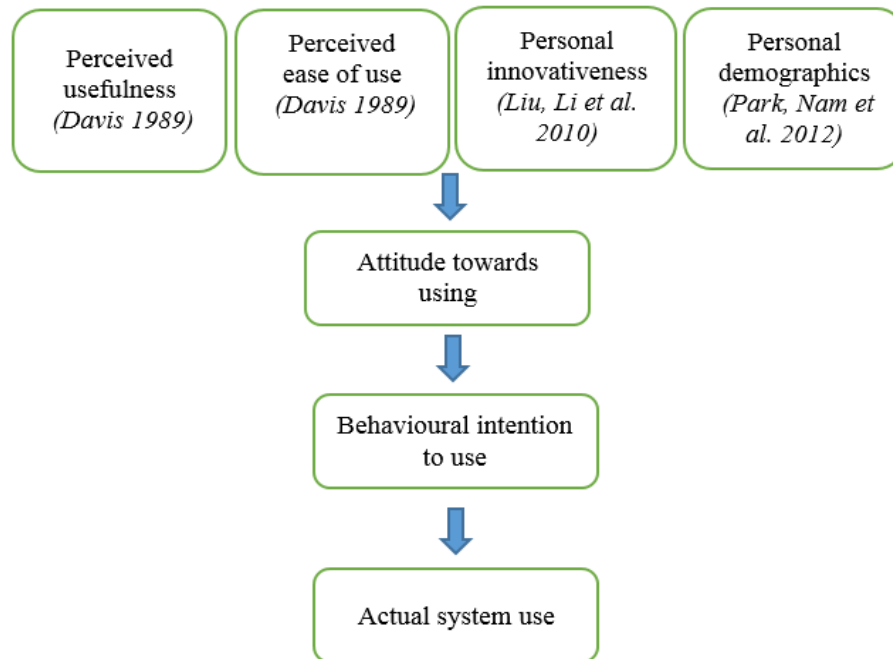
Source: Adapted from Creswell et al. (2011), Kemmis and McTaggart’s AR Cycle (2005)

The planning stage collected data from pre-research questionnaire, pre-research surveys and my reflective journal. The acting and observing stage collected data from smartphone microblogging posts and polls through the Edmodo app. The reflective stage collected data from post-tests, post-research surveys, focus groups and reflective journaling. The TAM research instrument was used in both the planning and reflective stage of this research.

3.10.1. TAM

As discussed in the literature review, Mauroux et al. (2014) used the TAM research instrument to measure participants’ perceptions or attitudes to mobile microblogging’s perceived usefulness and ease of use (Davis 1989). I appended two external variables to TAM’s research instrument in order to provide a more in-depth insight into student’s perception of Edmodo. These external variables comprised personal innovativeness and personal demographics. Personal innovativeness gauged students’ motivation and readiness to experiment with new technology like Edmodo (Liu et al. 2010). Personal demographics provided information in relation to students’ access to smartphones, Wi-Fi at home, and their behaviour regarding smartphone use before and during this research

(Park et al. 2012). This tailored TAM instrument consisted of the following four variables as Figure 3.5. illustrates:



*Figure 3.5.: TAM for smartphone microblogging in post primary Religious Education
Source: Park et al. (2012), Liu et al. (2010), Davis (1989)*

These four TAM variables measured the students’ experience and perceptions of using the device aspect, specifically the smartphone and Edmodo app to support mobile learning through homework assignments on ‘Images of God’. Data was collected from pre and post questionnaires and surveys.

3.10.2. Pre and post questionnaires and surveys

PAR methodology advocates that research participants should be immersed and engaged within all research stages including data collection and data analysis (Kemmis and Mc Taggart 2005). As a result pre and post-research questionnaires recorded students’ cognitive learning on ‘Images of God’ and pre and post-research surveys measured students’ smartphone activity before and during this research. Students accessed these pre and post-research questionnaires and surveys on Edmodo using the online Google docs and paper form option in the initial pre-research questionnaire. All data was collated and charted graphically using Excel spreadsheets. In addition, pre questionnaires and pre

surveys identified students' smartphone ownership and internet access at home which assisted in the planning of this research. Data was also collected from students' posts on Edmodo.

3.10.3. Edmodo

Students' posts on Edmodo were collected and analysed for recording the practice and perception of smartphone microblogging in supporting the device, learner and social aspect of mobile learning. All nine hundred and eighty six Edmodo textual posts uploaded by students were analysed. Drawings, digital photographs, internet images and You Tube music videos were not analysed as they were used to support the students' textual explanation on Edmodo. The eight videos created on the smartphone app Animoto were not analysed as data analysis revealed that they did not generate online conversations on Edmodo. Textual uploaded post transcripts collected from Edmodo presented me with data on students' form and level of participation, interaction, connection, social construction and reflection. Edmodo was a valuable research instrument in the collection and analysis of data as its transparent platform made data visible, accessible and therefore 'available for careful study' (Stahl 2011, p.178). Edmodo was also an effective tool for providing a platform for students as co-researchers to express their experiences and opinions. The students' voice as co-researchers was also heard through the use of focus groups.

3.10.4. Focus groups

Focus groups were another source of data collection, eliciting information on students' experience and perceptions of employing Edmodo. Focus groups were chosen as they are 'one of the most powerful ways in which we try to understand our fellow human beings' (Fontana and Frey 2000, p.645). Within this research, focus groups swayed towards a perspective founded on PAR methodology, connectivism and social constructionism. Focus groups enabled collective connections and conversations featuring diverse experiences and opinions from all students based on 'direct evidence about similarities and differences in participants' opinions and experience' (Morgan 1997, p.10). As the interviewer, I employed a 'rapport talk' tactic which I deemed to be an effective approach in reducing any anxiety, intimidation or shyness among the young volunteer interviewees

(Mann and Stewart 2002, p.174). As the interviewer, I adhered to a planned format of questions based on the device, learner and social aspects of mobile learning with an open ended question offering students the opportunity to add an opinion, observation or ask a question. This was a strategy that Hoope et al (1995) viewed as promoting good practice (See Appendix O). This addition of an open ended question is attuned to PAR methodology where students engage and influence all stages of this research. Five focus groups consisting of volunteer students from each of the five first year classes enabled each class group to voice their experiences and perspectives. Focus group interviews were conducted in a parent room to ensure minimum interruption and intrusion. These groups were audio-recorded and then transcribed. This data added 'thick description' on the quantitative data gathered (Geertz 1973). This provided a telling insight into the cultural and social factors which influenced the research and consolidated the findings as recorded in my research journal.

3.10.5. Research journal

I used a research journal as a method of data collection. I also employed the journal to offer the possibility of validating and consolidating research as suggested by Kirk and Miller (1986). My role was similar to Janesick's (2011) metaphor of a dancer, as a researcher disciplined, determined, alert, engaged and immersed in 'hearing the data' through its PAR planning, acting and observing and reflection stages (p.2). My journaling acted as a 'self-critical reconnaissance' (Lewin 1948), that assisted me in reflecting on my values, assumptions, hunches, practice and observances on 'what went on backstage in the research' (Ellis and Bochner 2000, p.741). My journaling also facilitated reflection on my teaching practice, for supporting improved teaching practice on students' learning through smartphone microblogging and the balance of power among research participants. As a reflective practitioner I engaged in reflecting-in-action on the planning, acting and observing and reflecting phases of this PAR research and reflecting-on-action after the research, especially in the process of data analysis.

3.11. Data analysis

Within this research data analysis of quantitative data involved the calculation of statistics using means, modes and standard deviation. These statistics became descriptive statistics

used for describing the data. Data analysis of qualitative data consisted of thematic analysis. Thematic analysis involves 'identifying, analysing and reporting patterns (themes) within data. It...organises and describes your data set in rich detail' (Braun and Clarke 2006, p.79). Themes encapsulate something important about the data that aims at addressing the research question. Thematic analysis within this research consisted of three stages: managing data, 'pre-coding' and 'coding contrasting data' (Saldaña 2009). The first stage involved managing data. Firstly, all qualitative data from focus groups and online text posts from Edmodo were typed out verbatim. Secondly this initial stage of data analysis included regular input of raw data onto Excel spreadsheets throughout the planning, acting and observing and reflection phases of this PAR research as advocated by O'Leary's (2004) framework. This strategy of systematically inputting data helped safeguard a clear, organised coding process throughout all phases of the PAR process. This strategy also facilitated my reflection on our experience of smartphone microblogging while I inputted memos or 'preliminary jottings' on the margin of the data's Excel spreadsheets as recommended by Saldaña (2009, p.17). Thirdly this stage of managing data involved the cleansing of data through checking for duplications in online questionnaires or surveys or partially filled-in surveys uploaded by the students onto Edmodo.

Within the second pre-coding stage I chose to manually code qualitative data as it facilitated a more 'hands-on' immersion within the research's small database. Within this stage I employed Koole's device, learner and social aspects of mobile learning as the initial predetermined and anticipated themes that could be 'reviewed, modified, deleted or expanded to include new codes' as the coding process developed (Saldaña 2009, p.121). Thematic analysis entailed classifying data into categories to label and link data that 'look alike' and 'feel alike' for processing a systematic, thorough, rigorous and reliable and focused coding analysis (Lincoln and Guba 1985, p.347). Within this stage I searched for these three key themes namely Koole's three aspects of mobile learning from the various data collected from pre and post surveys and questionnaires, focus groups and my own research journal. I organised the extracted data by highlighting the relevant data into three separate colour coded themes.

The third stage ‘coding contrasting data’ involved me coding the various data collected. This stage generated numerous number of codes which I organised into several categories linked with the three main themes. For example the thematic analysis regarding the social aspect of mobile learning produced the following three categories: pedagogy, a virtual learning community and a safe space. This third stage involved a cyclic, interpretive flexible heuristic repeated process as opposed to a static scientific strategy. This process involved me reading and revising data several times over thus allowing themes to emerge, reducing the codes by re-coding and re-categorising, minimising codes under Koole’s three aspects until categories were saturated.

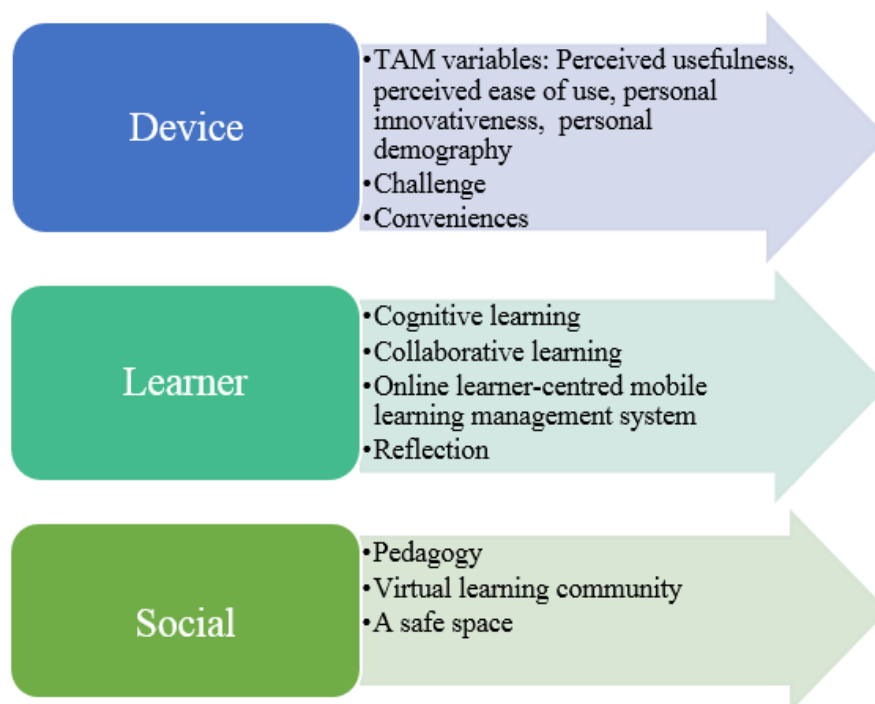
3.12. Summary

Chapter three outlined the structured framework in which the research design was accommodated. The philosophical principles underpinning the research design were positioned within a paradigm based on pragmatic ontological and epistemological assumptions. PAR methodology and the three AR stages of implementation using Kemmis and McTaggart’s (2005) cyclic AR spiral were enunciated. A five stage pedagogical plan adapted from Salmon’s (2003) five-stage scaffolding model of pedagogy was outlined. The sampling, ethics, data collection, including the TAM research instrument and data analysis implemented within this research were detailed. I also described the risk management strategy I developed for assisting with the safe and responsible use of Edmodo, and explored accessibility to smartphones and Wi-Fi. This design directed me as a teacher-researcher in the planning, acting and observing and reflecting stages of this AR research. Chapter four will present the findings that emerged from analysing the data collected, centred on our practice and perceptions of Edmodo.

Chapter 4: The acting and observing stage: The findings

4.1. Introduction

This chapter attempts to answer, to some extent, the research question: ‘What were our experiences of smartphone microblogging supporting mobile learning on ‘Images of God?’’. The findings emerged from a dataset that centred on our experience and perceptions of employing Edmodo. The chapter is positioned within the acting and observing stage of Kemmis and McTaggart’s (2005) AR cycle. The research was predicated on a mixed methods approach involving the collection and analysis of quantitative and qualitative data. Scrutiny of quantitative data involved the calculation of statistics using sums, means and standard deviations. Investigation of qualitative data involved thematic data coding using the device, learner and social aspects of the FRAME model. After several cycles of analysing, coding and interpreting quantitative and qualitative data, the following themes emerged. Figure 4.1. categorises these themes under the three aspects of mobile learning:



*Figure 4.1.: Summary of findings related to FRAME model
Source: Adapted from Koole’s FRAME for Mobile Learning (2009)*

The experience of learning, teaching and researching smartphone microblogging to support the device, learner and social aspects of mobile learning was not as defined or clear-cut as the neat compartmentalisation portrayed in Figure 4.1. might suggest. In reality, the three aspects of mobile learning are interconnected as Koole (2009) illustrates in her FRAME model Venn diagram (See appendix N) which guided me in the practical management of researching such a wide ranging and fluctuating field as mobile learning. This model also assisting me in focusing on the inductive discovery, rather than the deductive proof, of emerging issues centred on the device, learner and social aspect of smartphone microblogging within post primary Religious Education.

4.2. Data collection

Data sources comprised of pre and post-research questionnaires, pre and post-research surveys, students' posts uploaded onto Edmodo and feedback from five focus groups. The pre and post-research questionnaires primarily collected information on student's personal images of God. The questionnaires were especially focused on recording students' understanding of four concepts from the Junior Certificate Religious Education module 'Images of God' syllabus, both prior and subsequent to the commencement of the research (See Figure 4.11.). The pre and post-research surveys generally concentrated on gathering information on students' experience and perceptions of employing Edmodo. Students' Edmodo posts, together with feedback from the focus groups provided a rich insight into students' experiences of Edmodo supporting mobile learning on 'Images of God'. The number of students involved in the various sources of data collection are summarised in Table 4.1.:

Data Source	Number of students
Pre-questionnaire	81
Post-questionnaire	81
Pre-survey	99
Post-survey	83
Students who actively participated on Edmodo	92
Students who did not actively participate on Edmodo	13
Student focus groups	26

Table 4.1.: Summary of data collection sources and number of students involved

One hundred and six first year Religious Education students from five first year classes volunteered to participate in this research. Of these, one hundred and five students signed up for an Edmodo account, consisting of 57% male (n=60) and 43% female (n=45). My research journal was also employed as a source of data collection as it recorded my experiences during the planning, acting and observing and reflection stages of the research process. These recordings facilitated the systematic, pragmatic, reflective and collaborative approach advocated in mixed methods research.

4.3. A mixed methods approach

The research followed a mixed methods approach. Quantitative data consisted of descriptive statistics using numbers to describe, explain and summarise data. Qualitative data was thematically coded using the device, learner and social aspects of the FRAME model. Qualitative data and quantitative data provided validation, offered insights and revealed nuances on specific findings thus ‘dialectically, comparing and contrasting both sets of findings’ (Hesse-Biber 2012, p.141).

4.4. The device aspect

Findings related to the device aspect were based on four variables measured by a TAM research instrument. The findings revealed both the technical challenges and conveniences experienced by students in their employment of Edmodo.

4.4.1. TAM

This research employed a TAM research instrument specifically tailored to measure students’ experiences and perceptions of employing Edmodo for supporting mobile learning (See paragraph 3.11.1.). This TAM research instrument measured the following four variables:

- Perceived usefulness
- Perceived ease of use
- Personal innovativeness
- Personal demography

In the analysis of the first TAM variable, perceived usefulness, the post-research survey revealed that out of a total of seventy nine respondents, 97% recorded that they perceived Edmodo as a useful tool for learning about 'Images of God' (n-77). Similarly, 95% of eighty three respondents in the same survey recorded that they would use Edmodo again for learning (n-79). Evaluation of the second TAM variable, perceived ease of use, within the same post-research survey recorded that 95% of the eighty one respondents found Edmodo easy to use (n-77). Data related to the third TAM variable, personal innovativeness, revealed that 90% of ninety six respondents liked to experiment with new technology (n-86), as measured in question thirteen in the pre-research survey. These findings based on the first three TAM variables are summarised in Figure 4.2.:

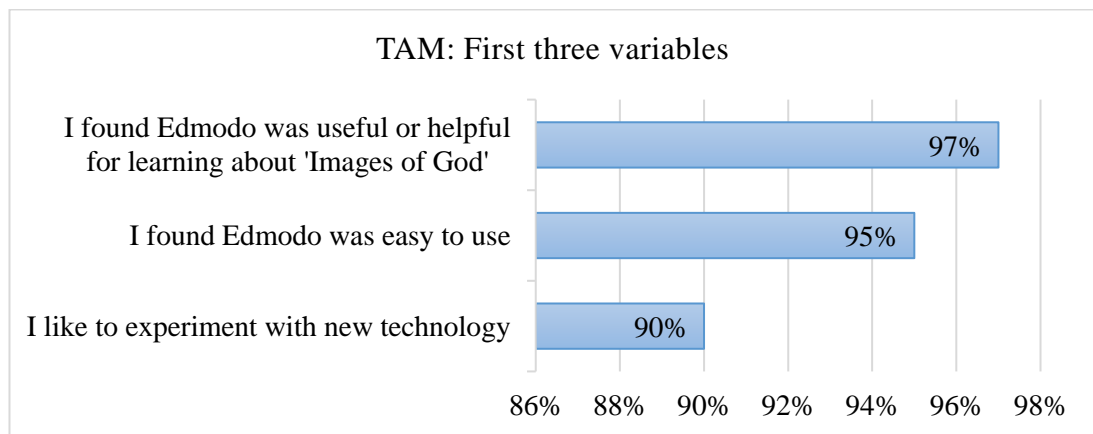


Figure 4.2.: TAM's first three variables - perceived usefulness, perceived ease of use, personal innovativeness
Source: Adapted from Liu, Li et al. (2010), Davis (1989)

There is a distinct correlation between the positive results reported by students in respect of TAM's first three variables, and the high number of posts uploaded by students during their initial employment of Edmodo. Quantitative analysis of posts uploaded onto Edmodo by ninety two students revealed that one hundred and sixty eight posts were uploaded in the first day, eighty six posts on the second, with a steady decrease over the following days. Posts over the first two days, accounted for 26% of the total number of students' posts uploaded over the course of this research (n-254).

The fourth TAM variable, concerning students' personal demography, recorded that 94% of ninety eight respondents in the pre-research survey owned their own smartphone (n-92), 96% of ninety nine respondents had internet connection at home (n-95), 57% of ninety nine respondents had received training or attended a workshop on internet safety (n-56) and that 2% of ninety four respondents used their smartphone for religion class work or religion homework before this research project (n-2). 100% of the eighty respondents claimed to have used their smartphones for smartphone microblogging within this research (n-80). Question six within the pre-research survey measured smartphone usage. The findings, from a total of ninety eight respondents, revealed that 43% used their smartphones continuously during the day (n-42), 44% several times a day (n-43), 8% once a day (n-8), 1% less than once a day but more than once a week (n-1), 3% once a week (n-3) and 1% less than once a week but more than once a month (n-1), as outlined in Figure 4.3.:

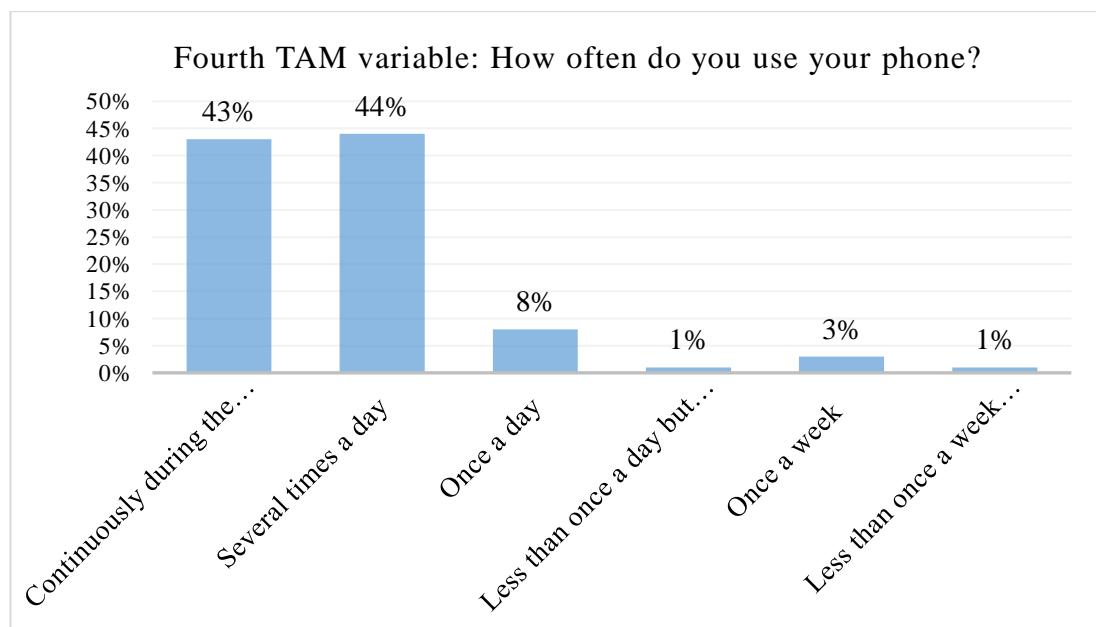


Figure 4.3.: Fourth TAM variable – Students' personal demographics: How often do you use your phone?

Question seven in the pre-research survey provided a list of options, as the research sought a more in-depth understanding of why students used their smartphone. The choice of more than one option was facilitated, resulting in a total of one hundred and fifty eight responses. Analysis of these responses established that 42% of students used their

smartphone for making personal connections with friends (n-67), 25% for social activities including online gaming, browsing or using smartphone apps (n-39), 15% for getting information on non-school work (n-23), 13% for looking up information for school (n-21) and 5% for making personal connections with people they did not know (n-8) as reflected in Figure 4.4.

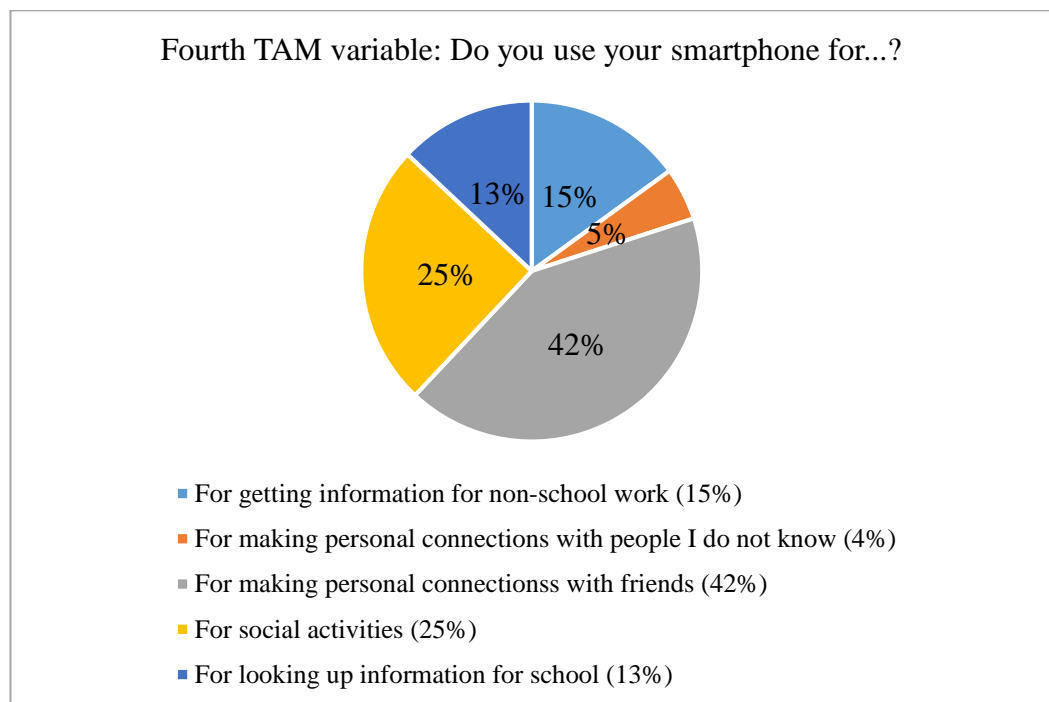


Figure 4.4.: Fourth TAM variable-Students' personal demographics: Do you use your smartphone for?

The fourth TAM variable also recorded what apps or platforms students regularly used on their smartphones from a pre-prepared list of options. The list was drawn from my previous pilot project research which identified popular smartphone apps and platforms used by Religious Education students attending the same post primary school (Morrison-Reilly 2013). From a total of five hundred and eighty six responses, Figure 4.5 illustrates students' use of the stated smartphone app or platform in chronological order.

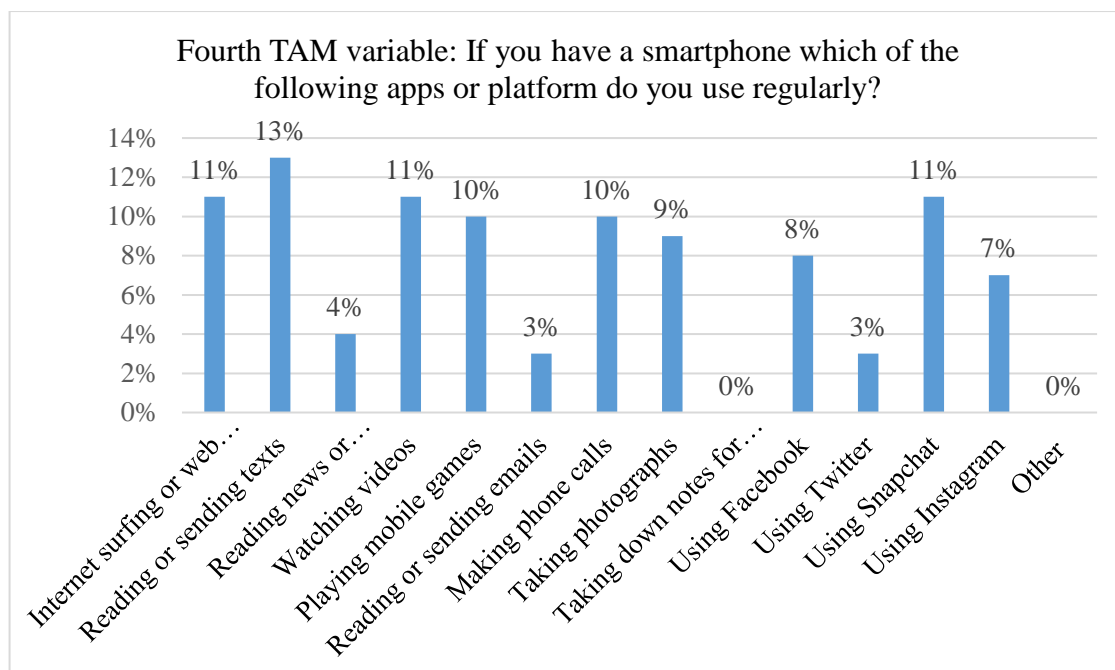


Figure 4.5.: Fourth TAM Variable - Students' personal demographics: If you have a smartphone which of the following apps or platform do you use regularly?

Reading and sending texts were recorded as the most regular activity in which students engaged on their smartphone. This activity was followed closely by internet surfing, watching videos and using Snapchat. Taking down notes for school was not recorded as a regular smartphone activity. Overall, these findings measuring the four specific TAM variables recorded that students perceived the smartphone device and the smartphone app Edmodo as a useful and easy to use technology. Findings regarding the device aspect also involved thematic coding of qualitative data collected from students' Edmodo posts.

4.4.2. Technical challenges and technical conveniences

Through thematic coding of qualitative data collected from Edmodo posts and focus groups, technical challenges and technical conveniences emerged as the two main issues relating to the device aspect of mobile learning. Students were asked from the onset to post their technical difficulties via Edmodo. 3% of nine hundred and eighty six posts uploaded by students focussed on technical challenges (n=31). Over half of these challenges were encountered by students from the first of the five classes involved in this research. The challenges identified difficulties in uploading Edmodo's quiz and the

video- making app Animoto, poor Wi-Fi connectivity at home, the small screen size of smartphones and distraction from learning. Figure 4.6. depicts an example of a student's post on Edmodo in regard to a technical challenge, specifically a screenshot of a difficulty encountered using the quiz feature on Edmodo:



Figure 4.6.: Post containing a screen shot outlining technical difficulties with Edmodo's quiz feature from class group 1, dated 18th March 2015

Within the focus groups, interviewees identified several technical challenges such as not being able to upload a profile picture or being unable to log onto Edmodo. Some believed that these challenges resulted from poor wireless connectivity at home, as one interviewee reported: 'Yes I had trouble logging into it because of Wi-Fi' (FG3:1). Another challenge reported by two interviewees concerned both the inconvenience of using the smartphone's small screen for learning and the issue of distraction. Distraction within smartphone microblogging entailed students moving away from the learning task at hand in order to engage in non-learning activities on their smartphones. Texting and talking to friends was identified as a distraction from homework assignments on Edmodo as articulated by the following interviewees within focus groups: 'The first time I would have text but I would go straight back to it [Edmodo's homework assignments]' (FG2:4) and 'I go and talk to them [friends] and then get carried away' (FG6:3). In contrast, several other interviewees found the standard offline classroom interaction was more distracting compared to communicating via Edmodo as detailed by the following focus group interviewee:

Because if you are sitting down at the back of the classroom ... the teacher could let you start homework, you could be talking to your friend. You could be getting distracted and putting less effort into your homework but rather as if you are alone [on Edmodo] you know the teacher is watching what you are doing and when you are putting up your homework, you obviously put more effort into it (FG 6:3)

This account dovetails with another interviewee's explanation as to how she was so engaged in the homework assignment on Edmodo that she did not have time to be distracted by her smartphone: 'You are so focused, like seeing other people posts, that you do not do anything else, it was not a big struggle' (FG6:1). Several students experienced Edmodo as less of a distraction in comparison to the traditional classroom as 'in the classroom you can talk sneakily but in Edmodo you cannot really talk' (FG4:1) and 'it cuts out the chat and you have more time to do stuff' (FG4:2). Data analysis revealed that 3% of the nine hundred and eighty six posts uploaded by students were off task (n=34). Off task posts consisted of colloquial chats that made no reference to the learning topic 'Image of God' as Figure 4.7. details:

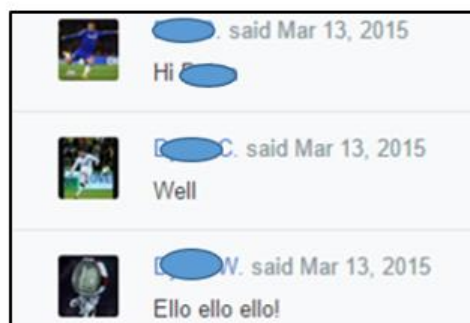


Figure 4.7.: Colloquial chats during the initial stage of smartphone microblogging among class group 1, dated March 13th 2015.

The conveniences that smartphone microblogging was found to offer included:

- Students' preference for typing over writing
- Smartphone portability
- Managing learning
- Increasing class time
- Promoting enjoyment for learning

Typing posts on Edmodo as part of homework assignments, was viewed by students as convenient in comparison to the traditional homework activity of writing into copies; ‘I would have done my homework a lot quicker and easier as well because you do not have to get paper pen, ruler, margin out the page or oh do I have this copy?’ (FG1:1). Several interviewees within focus groups reported that writing was laborious; ‘you just get tired of writing’ (FG6:2), ‘boring...messy’ (FG3:1) ‘a drag’ (FG2:3). The convenience of the smartphone’s portability was highlighted as ‘your back would be sore carrying all the books home’ (FG2:4). The use of Edmodo for homework assignments, as opposed to carrying books home, also eliminated the fear of forgetting books for completing homework assignments, as one student reported:

Yes you would hardly forget your phone because it would be in your pocket it is a lot easier to forget books (FG2:2).

The capacity of Edmodo for managing homework was acknowledged, for example ‘If you go home and forget what you have to do, your teacher will put it up on Edmodo’ (FG2:3). Furthermore some interviewees remarked on the facility Edmodo offered for learners to ask the teacher direct questions outside class time thus freeing up class time, as the following interviewee suggested:

If you had a question ... and you did not want to waste up that class, you can just ask it in Edmodo (FG3:1).

Interviewees commented on how they enjoyed using Edmodo for homework in comparison to the standard reading and writing in copybooks; ‘It is nice to have a break from that, to do something technical’ (FG6:4), ‘I liked that is was different, you can learn things other than reading from a book’ (FG1:1) and ‘I even find religion not that interesting really but it was better when we were doing it on our phone’ (FG6:2). These positive perceptions, recorded in focus groups, were reflected in several Edmodo posts as the following online discussion reveals in Figure 4.8.:



Figure 4.8.: Excerpt of online discussion on Edmodo from class group 5, dated 26th and 27th March

These positive comments and posts correspond with the post-research survey result which highlighted that 93% of eighty two respondents would recommend using Edmodo for learning in other subjects (n-76). Question fifteen in the post-research survey asked the following open ended question ‘If I was using Edmodo again I would...’ Answers recorded that the majority of students’ replies were positive, for example ‘use it [Edmodo] more often! I think it's great!! (POS48), ‘very much enjoy it’ (POS48), ‘like to see it used for other subjects’ (POS63). In conclusion, findings related to the device aspect established that Edmodo was perceived as useful for learning, easy to use and a convenient learning device that several students enjoyed employing. Findings also discovered that students encountered, to a small extent, technical challenges and distraction from learning in their user experience.

4.5. The learner aspect

The following themes related to the learner aspect of mobile learning emerged from the thematic coding of data collected: cognitive learning, collaborative learning, an online student-centred mobile learning management system and reflection. Within this research, these themes were inextricably linked.

4.5.1. Cognitive learning

The aim of this research was to investigate the experience of using Edmodo to support the device, learner and social aspect of mobile learning on ‘Images of God’ among first year post primary Religious Education students. The learner aspect of mobile learning implicates cognitive learning. Cognitive learning was supported and strengthened by students’ active participation on Edmodo through the creation and uploading of posts. These posts presented information and their personal opinions on ‘Images of God’ via Edmodo’s synchronised textual and visual channels of information as the following example in Figure 4.9. shows:



Figure 4.9.: An example of a student’s post detailing synchronised textual and visual channels of information from class group 1, dated 18th of March 2015

12% of the one hundred and five students who signed up for an account did not post anything on Edmodo (n-13). The remaining 88% of students actively engaged by uploading their personal opinions and experiences (n-92). Figure 4.10. details the relative engagement of students:

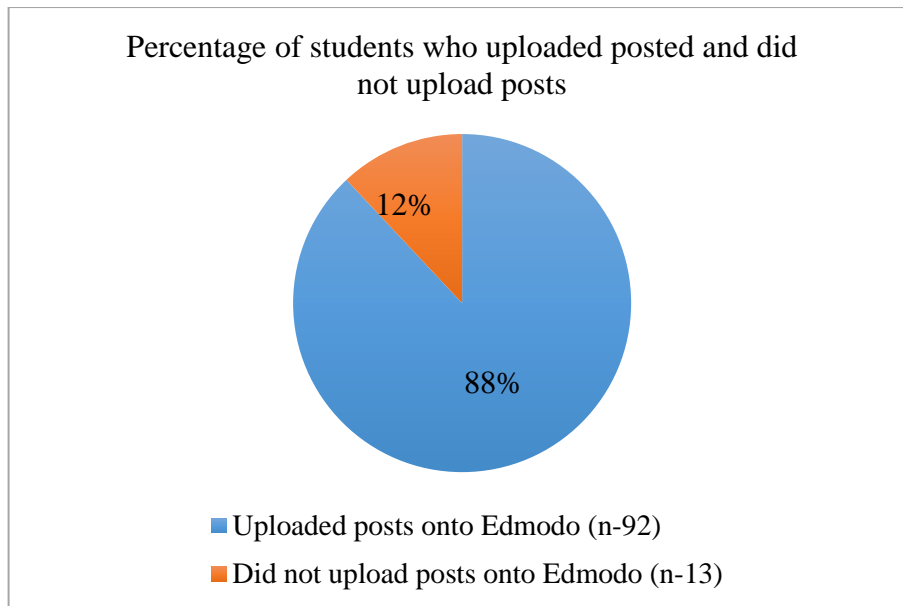


Figure 4.10.: Percentage of students who uploaded posts and did not upload posts

A total number of nine hundred and eighty six posts were uploaded via Edmodo. 97% related to the device, learner and social aspect of mobile learning on the learning topic ‘Images of God’ (n-960). Questions one to four in the pre and post research questionnaires measured student’s cognitive learning of four concepts pertaining to the Junior Certificate post primary Religious Education module ‘Images of God’, before and after this research. These before and after results are recorded in Figure 4.11.:

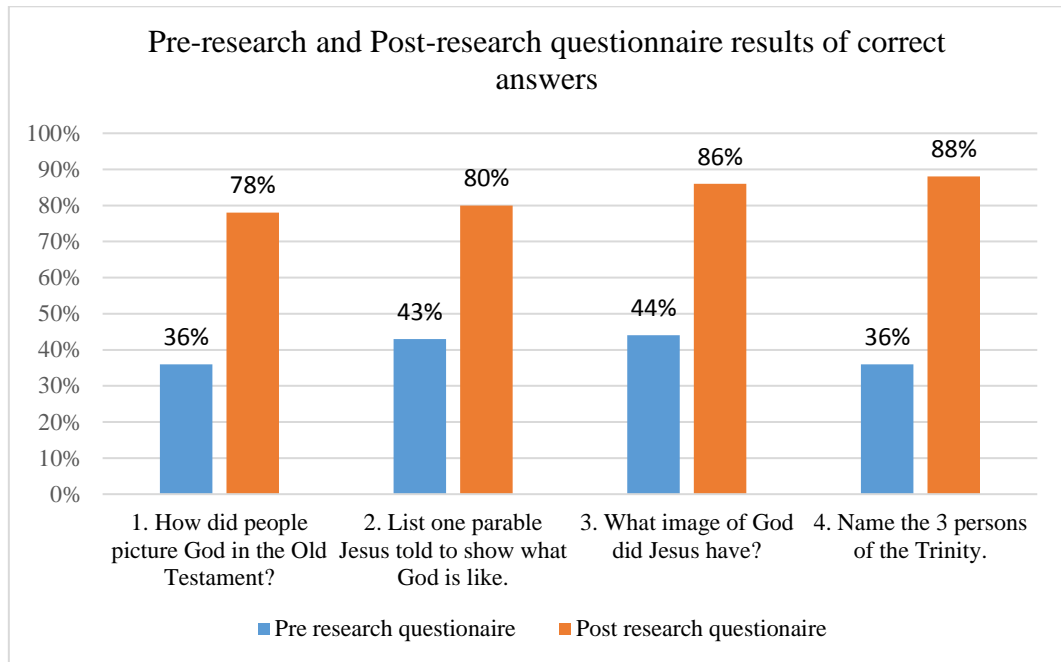


Figure 4.11.: Pre and post research questionnaire results of correct answers regarding students' cognitive learning of Images of God

The mean of the responses to these four questions in the pre research questionnaire recorded an average of 40% correct results whereas the post research survey recorded an average of 83%. This constituted a 43% improvement in students' understanding of the four concepts tested in the pre and post-research questionnaires. 17% of all posts comprised students' unique image of God, as created and uploaded onto Edmodo for peers to consume, comment on and critique (n-164). These posts consisted of text posts briefly explaining the individual student's personal image of God accompanied by sketched visual drawings created by the students and photographed on their own smartphone, personal photographs taken on their smartphones, images copied from the internet and several personal videos created through the smartphone app Animoto. As a result of these specific methods of posting, cognitive learning was supported and advanced through Edmodo's multi-media affordances supporting textual, visual and auditory channels of information (See paragraph 2.2.2.1.3.). Edmodo's support of collaborative learning advanced students' cognitive learning.

4.5.2. Collaborative learning

Collaborative learning involved examining both the quantity and quality of students' online social learning conversations centred on 'Images of God' within Edmodo. The quantity of Edmodo's collaborative learning conversations involved assessing students' perceptions of Edmodo's capability to support collaborative learning. The findings revealed that 97% of students' posts were involved in collaborative learning conversation on 'Images of God' with peers and myself, as the teacher-researcher (n-952). 3% of posts uploaded received no replies and therefore do not represent collaborative learning (n-34). The post-research survey recorded that 90% of seventy nine respondents learnt something from looking at their peers' posts (n-71). 90% of eighty two respondents recorded that other students' comments on Edmodo helped them learn (n-74). 91% of seventy eight respondents enjoyed looking at their peers posts (n-71). As one student reported in the post-research survey: 'I never thought of God as nature or animals but from looking at other people post I started to think that maybe God is nature and animals' (POS50). Findings relating to the quantity of Edmodo's collaborative learning involved calculating the number of posts within online conversations. Analysis of posts from each class group revealed that the range of posts involved in the online conversations varied from two to eighteen posts per conversation. These conversations usually involved several students asking questions, praising, agreeing or disagreeing with the initial post uploaded. The highest number of conversations was fifty seven involving just two posts. The lowest number of conversations involved eighteen different posts from peers and myself as teacher-researcher. The number of conversations, with its corresponding number of participating Edmodo posts, ranging from two posts to eighteen posts per conversation, is outlined in Figure 4.12 :

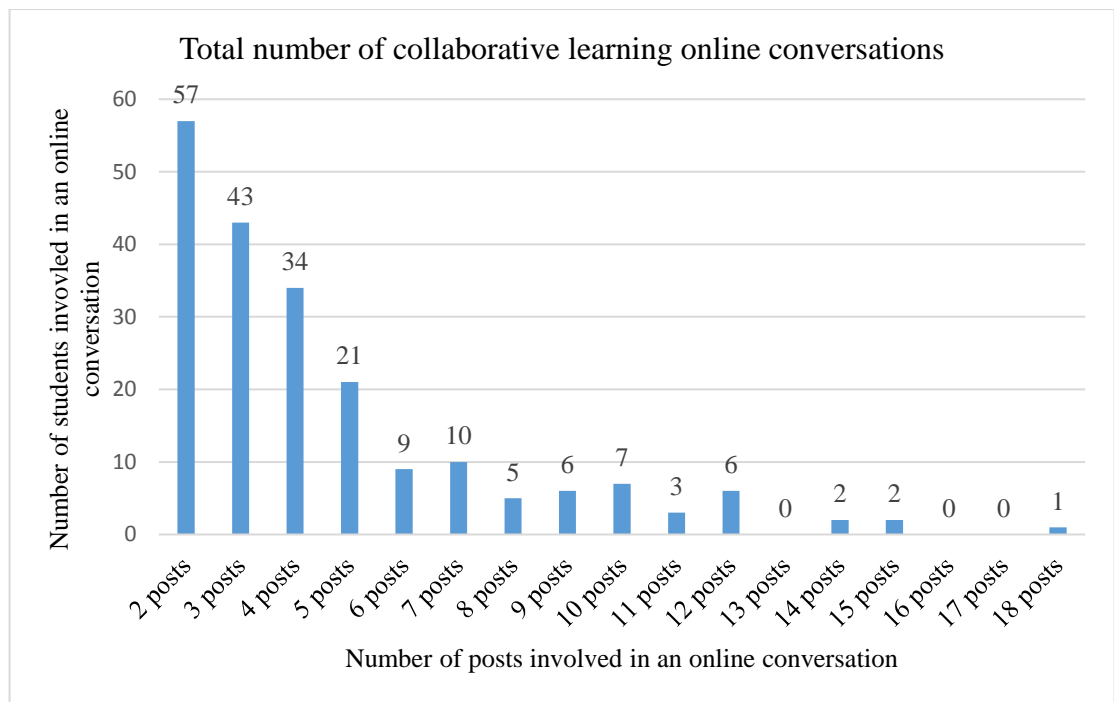


Figure 4.12.: The number posts and the numbers of people involved in an online conversations on Edmodo

This analysis of Edmodo posts focused on collaborative learning conversations. The findings revealed that approximately 94% of posts uploaded by students and myself as teacher-researcher engaged in collaborative learning conversations (n-1068). Edmodo provided an effective platform for students as co-researchers to express their preferences and voice their opinions. 31% of all students' nine hundred and eighty six posts consisted of replies either asking questions, praising or expressing a specific opinion on peers' posts (n-309). 46% of these replies were categorised as praise (n-143), 44% of these replies consisted of students' opinions (n-136), with 10% of students' reply posts centred on asking questions (n-30) as Figure 4.13. summarises:

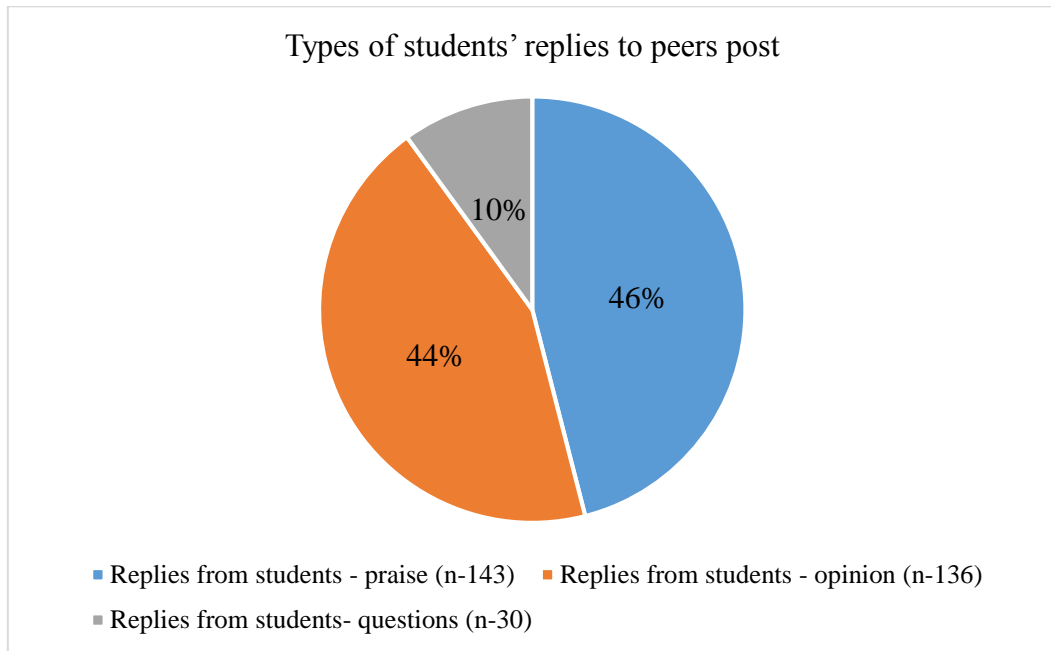


Figure 4.13.: Types of students' replies to peers post

46% of all student's replies were categorised as praise (n-143). Students praised peers on the posts they created and uploaded onto Edmodo. The majority of students' replies praising individual's 'Image of God' posts centred on praising their peers' artistic endeavours based on the drawings uploaded on Edmodo, rather than their textual content as this example in Figure 4.14. confirms:



Figure 4.14.: Praising a peers' post from class group 2, dated 23rd of April 2015

44% of students' replies centred on students' opinions (n-136). 4% of students' replies disagreed with an individual's post on their image of God (n-6), whereas 96% of students' replies agreed with their peers' posts describing their image of God (n-130). An example of students' replies agreeing and disagreeing with each other's image of God, thus demonstrating collaborative learning, is portrayed in Figure 4.15.



Figure 4.15.: An example of an online Edmodo conversation highlighting collaborative peer scaffolding from class group 3, dated 21st of March 2015

10% of replies involved students asking questions to peers or myself as the teacher-researcher (n-30). These questions mainly concentrated on queries relating to homework assignments or technical issues pertaining to Wi-Fi and the Edmodo app. Individual students were also asked to explain or expand on what they had posted. Very few questions probed or explored a deeper or reflective examination of 'Images of God'. These three categories of student feedback, affirm the post-research survey result which identified that 90% of seventy nine respondents found peers' comments on Edmodo

helped them to learn (n=71). Comments from focus group interviewees confirmed the learning value of other students' replies on Edmodo: 'It was inspiration from different things [Edmodo posts], it just helps' (FG3:2). The post-research survey also established that 91% of seventy eight respondents enjoyed looking at their peers' posts on Edmodo (n=71). This sentiment was similar to interviewees' comments on the appeal and enjoyment of Edmodo's collaborative learning experience: 'I like that you could see everyone's project and understand what they wrote' (FG3:1) and 'It was interesting because you only have your own image and after a while it can get boring, everybody else's image is interesting' (FG6:1). Eight videos were created using the video making app Animoto and uploaded onto Edmodo. None of these videos received replies from peers and therefore did not constitute collaborative learning.

The findings relating to collaborative learning also involved examining the quality of student's online learning and well as the quantity. Resulting from content analysis, the following categories emerged: students' enhanced understanding of the concept of images of God, an awareness and appreciation among students of the diverse images of God, including those students who did not believe in God and students' critical thinking around their personal understanding of images of God. Through collaborative learning students enhanced and advanced their understanding of 'Images of God', as individual student's presentation of their personal image of God often initiated a conversation. These conversations often encouraged students to think about their own image of God in relation to their peers' posts and, on occasion, resulted in a moment of insight or 'aha' moment. The following conversation depicts a student's 'Aha' moment, where a student's post describing their personal image of God as giving 'us a blank canvas to draw him in any way we like' resonates with a peer who stated 'I never thought of it like that. I agree!' as Figure 4.16. shows:



Figure 4.16.: Advancing understanding of ‘Images of God’ through collaborative learning from class group 4, dated 22nd of March 2015

Another example of collaborative learning supporting the understanding of ‘Images of God’ involved students’ questioning each other. For example, the following post illustrates a student questioning a peer as to where he obtained his image of God. The reply to this question acknowledged that the image was sourced from his second class teacher as Figure 4.17. outlines:



Figure 4.17.: A student’s questions an individual’s image of God from class group 5, dated 24th of April 2015

Collaborative learning on Edmodo supported the advancement of students' understanding of 'Images of God'. For example in the following conversation captured in Figure 4.18. the initial post presented an image of God as a carpenter's tools that 'help make us the person we are'. Four students joined in the conversation offering opinion on the image of God as presented. The final student extended the initial metaphor of God as a carpenter's tools in his image of God: 'I think God lets us build our own character' as illustrated in Figure 4.18.:



Figure 4.18.: Collaborative learning on Edmodo supporting the advancement of students' understanding and meaning of 'Images of God' from class group 4, dated 22nd of March 2015

Content analysis of Edmodo posts also revealed that students were offered an awareness and appreciation of the diverse images of God as iterated in the following student's post:



Figure 4.19.: A student's post on diverse images of God within Edmodo from class group 5,

60% of the eighty three respondents in the post-research survey indicated that they learnt something surprising from their peers on Edmodo (n=50). For example, students were surprised that 'everyone has a different image of God' (POS68), 'that not everyone believed in God and that God can be a man or woman' (POS13), 'some people are atheist' (POS63). Additionally, evidence from Edmodo posts also confirmed that several students did not have an image of God as they were unsure whether God existed or did not believe that there was a God. For example, this student presented his agnostic belief on a post which was reinforced by a black smartphone digital photograph as displayed in Figure 4.20.

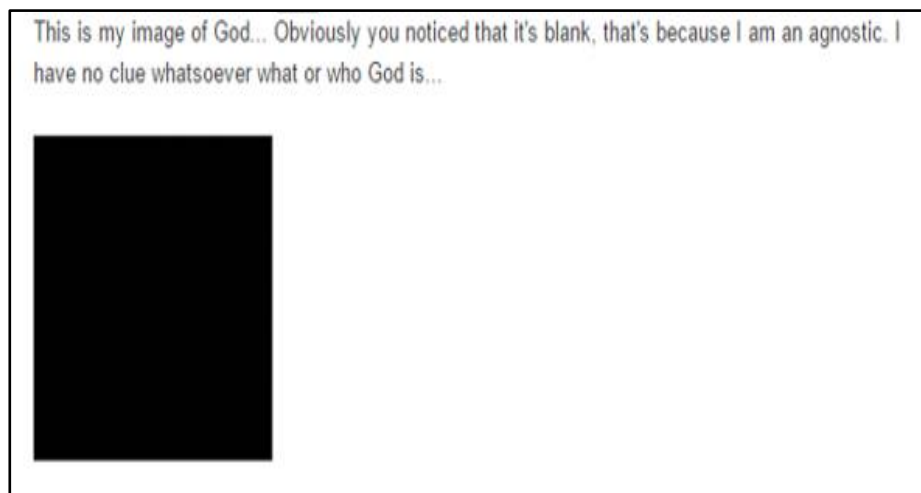


Figure 4.20.: An Edmodo post displaying an agnostic image of God from group 4

These examples of Edmodo's conversations and posts revealed that students showed an awareness and appreciation of the diverse images of God including agnostic and atheistic worldviews. Edmodo's support of collaborative learning enhanced collaborative thinking through analysing and synthesizing information posted onto Edmodo which facilitated a clearer understanding of 'Images of God'. An example of this collaborative thinking is evident in the following conversation where students analysed and synthesized information on the images of God as presented, through the processes of disagreeing, agreeing, questioning and rationalising as portrayed in Figure 4.21.



Figure 4.21.: An example of collaborative critical thinking from class group 3, dated 18th to 25th of March 2015

The conversations outlined in Figures 4.18. and 4.21 present evidence of collaborative learning between peers. These conversations enhanced some students' understanding, critical analysis, awareness and appreciation of diverse images of God and non-images of God. In short, the findings reveal that Edmodo was utilised by students as an effective tool. Edmodo's support of collaborative learning was perceived by students as strengthening their cognitive learning of 'Images of God'. The learner aspect of mobile learning was also supported by Edmodo's capacity as an online learning management system.

4.5.3. Online student-centred mobile learning management system

The findings confirmed that Edmodo was an effective online learning management system. It supported the identification and resolution of technical challenges, the management of homework activities that supported mobile learning and a transparent and student-centred learning system. Students uploaded their difficulties or queries online for peers or myself as teacher-researcher to answer and resolve. 3% of the nine hundred and eighty six posts uploaded by students were centred on technical challenges (n=31). 42% of these posts were answered promptly by me as the teacher or by peers through Edmodo (n=13). Evidence from data suggests that Edmodo was an effective online system for managing homework assignments. Through Edmodo I posted assignments on 'Images of God' which students had to create and post onto Edmodo, along with reminders as to when homework assignments were due. Several students reported positively on this system as the following student articulates:

I like it because sometimes the teacher is teaching his or her lesson and you do not get a chance to write down homework and on Edmodo all you had to do was click a button and there is was (FG3:3).

Edmodo enabled students to access homework assignments and resources anytime and from anywhere. This absent student posted me a direct question on what homework assignments he had missed as outlined in Figure 4.22.:

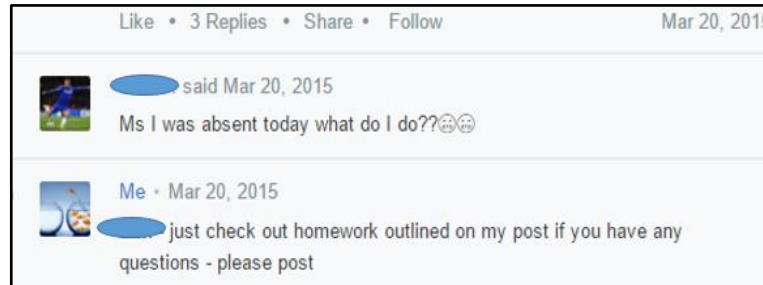


Figure 4.22.: A conversation highlighting an absent student asking for homework missed from class group 1, dated 20th of March 2015

Edmodo’s online mobile learning management system also facilitated learning from anywhere. For example, an absent student accessed Edmodo while abroad as shown in Figure 4.23.



Figure 4.23.: Edmodo accessed by a student from abroad from class group 4, dated 18th of May 2015

Several interviewees within focus groups identified Edmodo as an open transparent online management system. It offered the opportunity for students to view peers’ work, an opportunity that would not be possible in the traditional off line classroom environment: ‘You do not go around seeing other people’s books so everything is just up there [Edmodo]’ (FG3:1). One student commented on how the transparency of Edmodo

enabled the teacher to observe her work, thus prompting her to work harder and improve her standard of work posted online: ‘You know the teacher is watching what you are doing and when you are putting up your homework, you obviously put more effort into it’ (FG 6:3). It provided an opportunity for some students to copy and paste opinions and ideas from their peers’ posts. For example within one first year class group, ten out of seventeen individual students uploaded their image of God as an eagle within a timeframe of two days. Despite this suspected plagiarism, overall evidence from data showed that Edmodo was an effective online system for managing homework assignments and for supporting student-centred learning. Student-centred learning positions the student at the locus of control resulting in the acquisition of a more personalised and relevant knowledge relating to the individual’s unique experience. Within Edmodo, student-centred learning was evident in students’ active construction, dialogue and reflection on their own personalised images of God. Figure 4.24. displays a text based post on a student’s image of God, reinforced by her personal drawing of her image of God, photographed and uploaded onto Edmodo through her smartphone:



Figure 4.24.: A student’s Edmodo post depicting and describing their image of God from class group 2, dated 17th March 2015

Some students depicted their images of God through digital photographs from their own home environment. Figure 4.25. displays two photographs from an individual student’s local beach and lambs from her farm at home, representing her image of God in nature and animals:



Figure 4.25.: An Edmodo post describing an image of God from class group 2, dated 21st April 2015

These examples of student-centred learning provide evidence of authentic mobile learning in operation. For example, a student's image of God as the Sacred Heart of Jesus taken from the student's real world or authentic setting in their kitchen at home, was photographed and uploaded onto Edmodo using a smartphone as Figure 4.26. illustrates:



Figure 4.26.: An Edmodo post depicting an image of God from a picture at home from class group 5, dated 10th of March 2015

These examples from Figure 4.25. and Figure 4.26. highlight personal images of God photographed within the authentic setting of students' home environment. This provides evidence of Edmodo supporting a more student-centred learning experience in comparison to the traditional classroom context. In short, evidence indicates that Edmodo was an effective online learning management system that supported the identification and resolution of technical challenges and the management of homework activities that supported a mobile, transparent and student-centred learning system. Reflection, an intrinsic element of student-centred learning, was also supported by Edmodo.

4.5.4. Reflection

Overall findings revealed that reflection was supported by students' use of Edmodo. It offered students a place to reflect on their own image of God, to reflect on how their image of God had affected or influenced their life and how they acted. For some students reflection transformed their personal image of God. 51% of ninety eight respondents reported in question seventeen of the pre-research survey that they had thought about, reflected or wondered about God since beginning post primary education (n-50). Question twenty two in the post-research survey recorded that 71% of seventy five respondents testified that they had thought about images of God during the first year of attending post primary school (n-53). In comparing results in the pre-research survey with the post-research survey, a 20% increase was recorded. This finding indicates that Edmodo offered a place for promoting students' reflection on their own image of God.

Following on from this result, the findings also revealed an increase in how students' reflection on their image of God had affected or influenced their life and how they acted. In question six of the pre-research questionnaire 22% of seventy six respondents declared that they had thought about how their image of God had affected or influenced their life and how they acted (n-17). A related question of the post- questionnaire; question six, revealed that 59% of the seventy six respondents maintained their image of God had affected or influenced their life and how they acted (n-45), as the following replies detail: 'We should be grateful that he created everything' (PREQ9), 'Be kind to nature' (PREQ12), 'It makes me better' (PREQ13), 'Because he [God] is an inspiration' (PREQ25), 'I think my image of God affects my life in to do more community work ...and

start helping more' (PREQ30). These replies show a change or transformation in how students' pictured their image of God and how they perceived that their image of God affected their daily lives. These results between the pre and post- questionnaire reveal an increase of 37% on how students thought their image of God had affected or influenced their life and how they acted.

The findings revealed that reflection often resulted in students changing or transforming their personal images of God. The pre and post-research questionnaire question seven asks 'What image of God or picture comes into your mind when you think about God?' Results from the pre-research questionnaire answers found that 64% of the 78 respondents described the image of God they pictured when they thought about God (n-50). In contrast, findings from the post-research questionnaire revealed that 90% of eighty respondents described the image of God they pictured when they thought about God (n-72). Further data analysis involved coding of the images of God as described by respondents in the pre and post-research questionnaires. The pre-research questionnaire coded answers from fifty respondents. Arising therefrom, the following five main categories emerged; 56% described human qualities (n-28), 18% nature qualities (n-9), 10% affective attributes (n-5), 8% divine qualities (n-4) and 6% symbols (n-3). In the post-research questionnaire, eighty responses to the same question gave rise to the following four main categories; 59% expressed human qualities (n-47), 23% nature qualities (n-18), 10% symbols (n-8) and 6% affective attributes (n-5). The differences in respondents' descriptions of the image of God they pictured when they thought about God, as sourced from the pre and post-research questionnaires, are outlined for each stated category, in Figure 4.27.

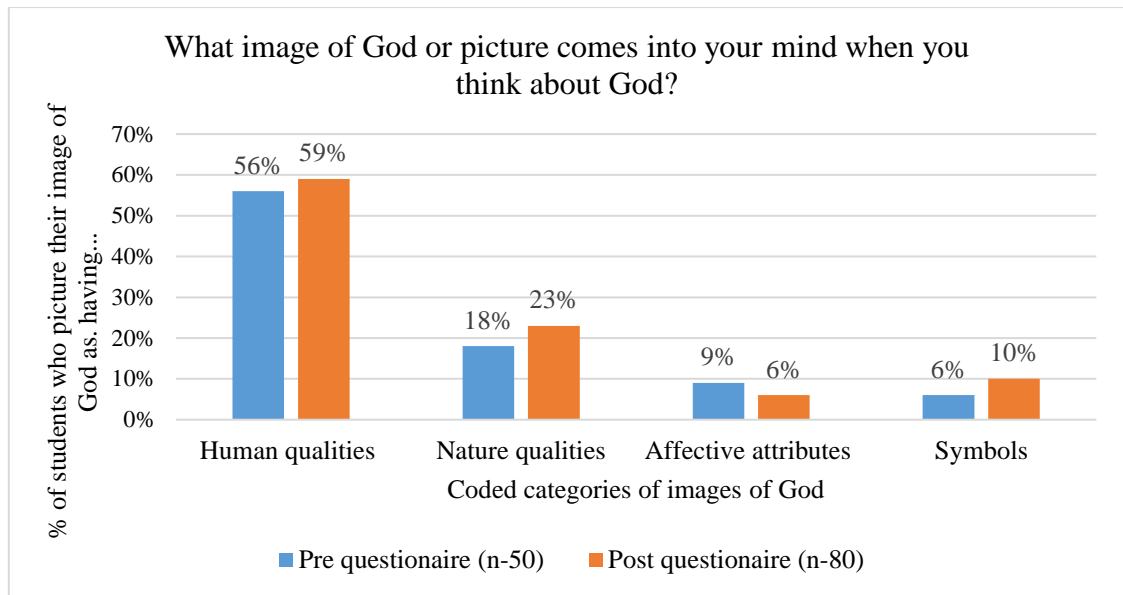


Figure 4.27.: Percentage of students' image of God categorised from pre and post-research questionnaires

Differences in the pre and post-research questionnaire categories as coded from the data, highlight a small change in how students' pictured their image of God. Although the results do not indicate a major transformation, data analysis did pinpoint some small changes. For example, the human qualities recorded in the pre-research questionnaire depicted students' images of God as dominated by male qualities. Results from post-research questionnaire calculated that 6% of respondents pictured their image of God as having female human attributes (n=5). These results were linked to the post-research survey question twenty: 'If your image of God has changed since you started this project explain how it changed?' Answers included 'Before I thought God was a he and that he lives up in the clouds and he looked like Jesus now I think that he is all around us in nature and people and animals etc.' (POS50), 'At the start I never had an image of God but now I do think of God as nature and flowers, I think he is the earth' (POS46), 'It used to be what people saw as satan. But now I see God as a person like Zeus or one of his helpers' (POS53). Some students uploaded posts describing how their image of God had changed during this research project. For example, this post describes the student's initial image of God as a church building, whereas now her image of God is in 'everyone and everywhere' as recorded in Figure 4.28.



Figure 4.28.: A student's posts on their changing image of God from class group 2, dated 21st and 26th of March 2015

This evidence from Figure 4.28 is indicative of findings recorded from seventy eight respondents in the post survey which found that 45% had changed their image of God since beginning this research (n-35). Although Figures 4.27 and 4.28 indicate that reflection on personal images of God within Edmodo occasionally resulted in students changing their image, one student recorded that such was not the case. In this instance, reflection through the online conversations on Edmodo, helped in the grasping of a deeper level of understanding in relation to the image of God: 'It has not changed in a way where I would change anything else, it is more like I can see more things in the things I believe' (FG1:1).

In conclusion, presenting the findings on the learner aspect of mobile learning through quantitative and qualitative data collection and analysis revealed that Edmodo supported cognitive learning, collaborative learning, an online student-centred mobile learning management system and reflection which occasionally resulted in transformation. Edmodo's support of the learner aspect was influenced by its support of the social aspect of mobile learning.

4.6. The social aspect

The social aspect of mobile learning concerns social communication and collaboration (Koole 2009). The following themes emerged from data analysis of the social aspect of mobile learning:

- Pedagogy
- A virtual learning community
- A safe space

4.6.1. Pedagogy

Findings revealed that I uploaded one hundred and fifty one posts onto Edmodo. These posts supported the device and learner aspect of mobile learning both by asking questions to students on their images of God and providing technical support to students. Detailed analysis of my posts recorded that 47% related to questions to students on the posts on 'Images of God' (n-71). A further 20% consisted of detailing homework assignments to students (n-31). 19% praised students on their work on Edmodo (n-29). 8% comprised the delivery of learning resources to support student learning on 'Images of God' (n-12), whilst 5% of posts focused on resolving the technical issues that students' encountered (n-8). The findings are summarised in Figure 4.29.:

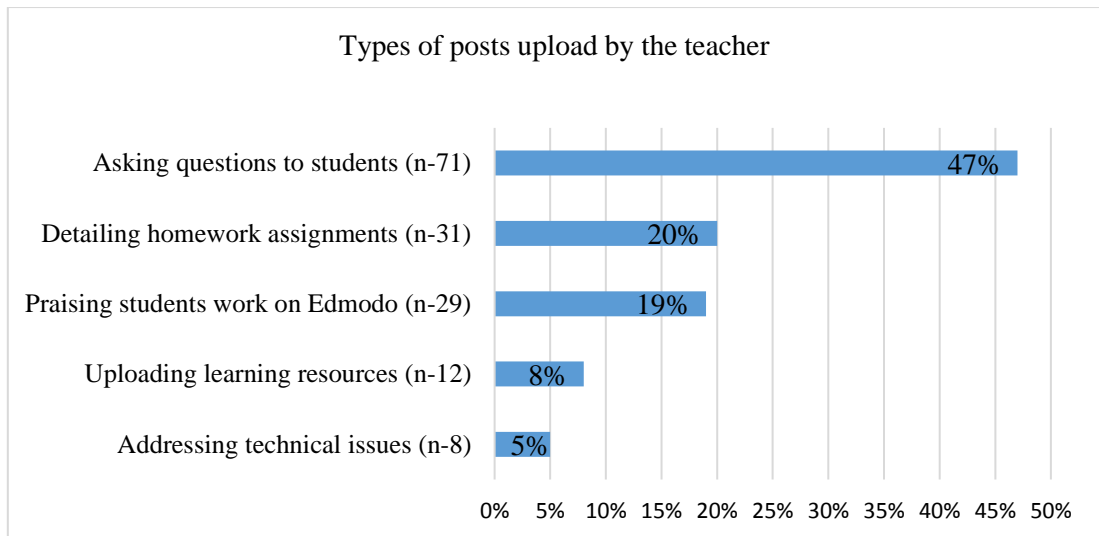


Figure 4.29.: Types of posts uploaded by the teacher onto Edmodo

The findings indicate that a large proportion of my posts, 47% in total, consisted of my asking questions to students on their posts (n-71). These findings illustrate how I scaffolded students learning about ‘Images of God’ by asking lower and higher order questions. Results from data analysis established that 86% of questions posed were lower order questions (n-61). These lower order questions primarily centred on eliciting further explanations from students on their image of God when initial posts were either unclear, too brief or unfocused. A brief example of this lower order questioning to support students’ learning is detailed in Figure 4.30.:



Figure 4.30.: An example of the teacher’s lower order question and student’s reply from class group 4, dated 22nd and 23rd of March 2015

14% of questions were higher order questions (n=10). Of the seventy one lower and higher order questions I asked individual students on Edmodo, thirty eight students replied. This indicates that 53% of my questions were left unanswered. 5% of my posts related to the resolution of technical issues (See Figure 4.29.). These posts consisted of prompt replies to individual technical challenges posted online as illustrated in Figure 4.31.

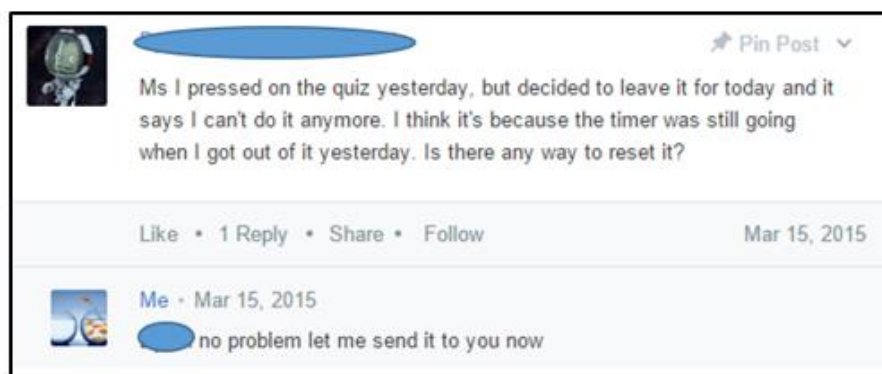


Figure 4.31.: Resolving technical issues from a student in class group 2, dated 15th of March 2015

The majority of students perceived my comments as supporting their learning. 94% of eighty three respondents perceived the comments as helping them 'learn and understand on Edmodo' as recorded in question fourteen in the post-research survey (n=78). This finding was confirmed by several interviewees in focus groups who viewed my teacher role within Edmodo as helpful. One interviewee stated: 'The teacher's posts were there to help us, things we did not do or things we could do to improve' (FG1:2). Several interviewees also viewed the teacher's role as a monitor of students' posts to ensure online safety within Edmodo's virtual learning community.

4.6.2. A virtual learning community

A virtual online learning community consists of learners and teachers communicating, connecting, consuming, creating and constructing information collaboratively centred on a shared educational aim. Findings from the data established that Edmodo's virtual learning community was nurtured by positive affirmation and comments from peers and myself, as the teacher-researcher. Findings also indicated that Edmodo's virtual learning community supported the inclusion of students' voices, an improvement of interpersonal relationships and extended conversations that would not have been possible within the

conventional classroom. As outlined in Figure 4.13. 46% of all students' replies were categorised as praise for peers (n-143). These posts positively affirmed and validated uploaded posts. This feedback may therefore have added to the positive sense of community identified by several students in the focus groups. Furthermore, 3% of students' posts were categorised as off task posts (n-34). These off task posts included students posting positive comments like 'Happy Saint Patrick's day' and 'Good luck with the summer exams' during and after the research as Figure 4.32. depicts.

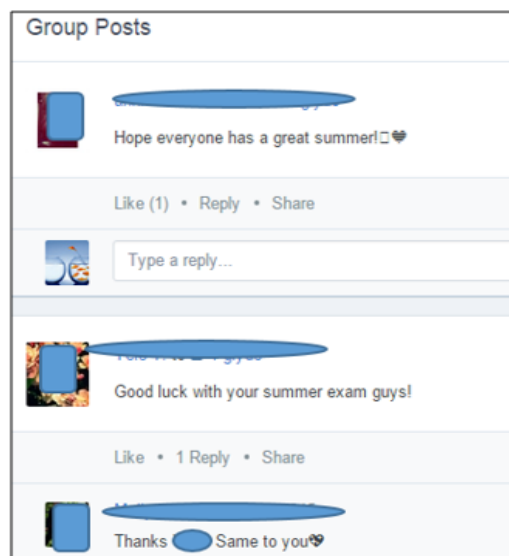


Figure 4.32.: Positive affirmation posts on Edmodo from class group 5, dated 20th of May 2015

These off task posts contained positive comments. The findings focusing of the social aspect of mobile learning also reveal that Edmodo's virtual learning community facilitated the inclusion of students' voices, voices that would normally not communicate in conventional classroom conversations. Several interviewees remarked that Edmodo provided more opportunities for students to connect through interactive posts in comparison to the more traditional classroom interactions as 'In a normal class you would be able to get your beliefs across but sometimes the teacher would say stop it' (FG1:1) and 'You are able to get your point across, if in class and you have your hand up you might not get picked' (FG1:2). Several students commented that Edmodo's facility to post directly to the teacher could minimise embarrassment as one student explained:

I like it because you can private your message so you can only sent it to the teacher and no one can see what you have written you would be embarrassed (FG3:3)
The findings revealed that a perceived improvement in interpersonal relationships between students. 77% of eighty two post-research survey respondents to question thirteen claimed that they got to know their peers better through using Edmodo (n-63). This claim was reiterated by several interviewees: ‘I got to know their actual personalities’ (FG1:2), ‘I got to see that my friends were from different religions I did not know that’ (FG3:3) and ‘I think it is better for the social aspect because you can get into each other minds and know what their images of God is’ (FG2:1). Furthermore interviewees identified the possible opportunity that Edmodo’s virtual learning community could offer to support incoming first years’ social transition into post primary school:

Interviewee 1: I think that there should be one [Edmodo] between first years and second years so they can interact and tell us how to help us (FG3:3).

Interviewee 2: Help us with homework (FG3:5).

Interviewee 1: Yes, show what school is like and if we have any questions (FG3:3).

Edmodo’s virtual learning community presented an opportunity for students to discuss concepts beyond those outlined in the Junior Certificate Religious Education syllabus ‘Images of God’. For example the following interchange on Images of God extended the conversation to address students’ concept of prayer as portrayed in Figure 4.33.



Figure 4.33.: An Edmodo a conversation on Images of God that extended to the concept of prayer from class group 4, dated 21st and 22nd of March 2015

This conversation took place over two days and involved five different students. It would not have taken place within a conventional classroom setting. In summary, the findings established that Edmodo’s virtual learning community was perceived as a positive learning support that facilitated inclusion, improved interpersonal relationships and offered learning opportunities not feasible within the traditional classroom. It offered Religious Education students a safe space to engage in debate on their images of God and to improve interpersonal relationships with peers.

4.6.3. A safe space

Edmodo offered a safe space for students to identify, reflect, disclose and discuss their own images of God and how these images impacted on their lives and behaviour. The results from the pre-research survey question fourteen revealed that 41% of ninety eight respondents had an image of God (n=40). In contrast, question 17 in the post-research survey found that 83% of eighty two respondents stated that they had an image of God (n=68). These findings identify a difference of 42% and affirm that Edmodo offered a space for students to identify their own images of God. Findings indicate that Edmodo offered students a safe space to disclose and discuss their own personal images of God. Several interviewees commented that past discussions on images of God within the traditional classroom were limited as conversations were ‘not in detail, not personal, just in general’ (FG1:1). Therefore the opportunity to disclose and discuss their personal image of God was not available. The following excerpt from of a focus group conversation highlighted students’ experience of Edmodo as offering an opportunity for disclosing and discussing personal images of God:

- Interviewee 3:* If you walked up to a person in real life and said what you think of God they probably would not tell you. (FG5:1)
- Interviewer:* Why is that?
- Interviewee 3:* Because they are embarrassed or something, I do not know. (FG5:1)
- Interviewer:* Would you be embarrassed if the teacher asked you in class?
- Interviewee 3:* Probably, yes a little bit. (FG5:1)
- Interviewee 4:* Because [in Edmodo] you do not speak in front of everyone. (FG5:5)
- Interviewee 1:* And they [students] were showing their stuff too. (FG5:3)
- Interviewee 4:* Yes and you were not standing in front of people (FG5:5)

Several interviewees felt that they would find discussing images of God in the conventional classroom embarrassing. Several students commented on the opportunity afforded by this research to think and reflect on their image of God as detailed in the following post in Figure 4.34.



Figure 4.34.: A student's post: 'I never thought about my images of god but this what I think', post from an individual student from class group 3, dated 24th of April 2015

Within the post-research survey question eighteen: 'This is how I see my image of God now' 90% of eighty respondents reported that they had an image of God (n-72). 10% selected the option of God 'not existing' (n-8). Within this post-research survey the following students' comments highlighted their atheist or agnostic beliefs: 'I don't know if I believe in God', 'I do believe him', 'I do believe in him but I have my doubts, I'm a type of person who has to see it to believe it', 'I don't believe in anything. I think that an idea of somebody who done such things as god has done is impossible', 'because I don't like being told what to do forcefully, so I do the complete opposite' 'I believe in nothing but logical thinking' and 'I believe there isn't a god but when you die, you are reincarnated. I don't believe in a god because a god doesn't really appeal or make sense to me much'. Figure 35 details my exchange with a student who described himself as a humanist:

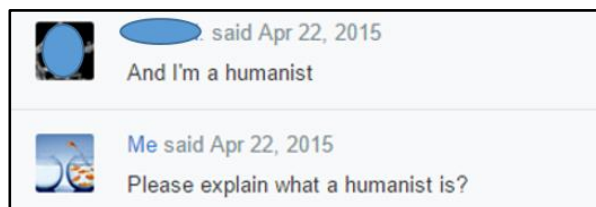


Figure 4.35.: A student's post: 'I am a humanist' from class group 5 from class group 5, dated 22nd of April 2015

These findings show that Edmodo was perceived by students as a safe space for students to express, communicate, share and connect with their personal image of God including atheist and agnostic beliefs.

4.7. Summary

This chapter presented the findings which emerged from analysis of data collected from all co-researchers; both the students and myself as teacher-researcher. The findings provided an insight into our experiences and perceptions of Edmodo in supporting the device, learner and social aspects of mobile learning within post primary Religious Education. The device aspect established that students perceived Edmodo as a useful, easy to use learning tool as measured by the TAM research instrument. Results also revealed that students experienced Edmodo as convenient for learning despite encountering some minor technical challenges. The findings on the learner aspect highlighted that Edmodo may have supported cognitive learning in ‘before and after’ results on testing of four concepts from the Junior Certificate module ‘Images of God’. Collaborative learning through students dialoguing with peers resulted in the advancement of their cognitive learning and facilitated an appreciation of the diverse images of God presented by students on Edmodo. Learning was further scaffolded through the online management system that promoted student-centred learning anytime and anywhere. Reflection on personal images of God and its implication for human behaviour was prompted through the use of post-research survey and post-research questionnaire questions and through online questioning in Edmodo. Findings indicated that the majority of students reflected on ‘Images of God’. Less than half of the participating student cohort transformed their personal image of God. The findings in respect of the social aspect of mobile learning centred on pedagogy, specifically my scaffolding of students’ learning through the use of lower order questions. Evidence from data analysis revealed that Edmodo’s support of a virtual learning community provided a safe space for students to connect with and communicate their own personal image of God including agnostic and atheist worldviews. Chapter five will interpret the findings presented in this chapter.

Chapter 5: The reflection stage: Interpreting the findings

5.1. Introduction

This chapter focuses on interpreting the findings. This involves understanding, analysing and critiquing our experiences of employing Edmodo to support the device, learner and social aspects of mobile learning within post primary Religious Education. The interpretation of findings also necessitates reflection on the planning, acting and observing stages of our employment of Edmodo as dictated by the third and final stage of the AR cycle.

5.2. The device aspect

Edmodo was perceived and experienced as an effective technology for supporting mobile learning on 'Images of God'. The TAM instrument employed within this research measured the students' perceptions of the following four variables:

- Edmodo as a useful technology for supporting learning
- Edmodo as an easy to use technology
- A willingness to use new technology
- The accessibility and usage of their smartphone as a personal device

Analysis of the first TAM variable revealed that the majority of students perceived Edmodo as a useful device for supporting learning. The majority of students did not experience or perceive the employment of their smartphone as a distraction from learning. This finding contradicts research that distraction from learning is often associated with smartphone use (Tossell et al. 2015; Kuznekoff and Titsworth 2013; Wei et al. 2012). Imazeki (2014) identified mobile phone distraction as 'the 21st century version of passing notes, doodling, or daydreaming' (p.245). The ECAR Study of Undergraduate Students and Information Technology (2014) recorded that 67% of teachers experienced the use of mobile devices in class as distracting, with 55% of teachers either discouraging or prohibiting their use in the classroom. The issue of distraction has led to some teachers 'banning this new technology from the learning space, demanding that students turn off their smartphones' (Parry 2011, p.16). Within this research, focus group interviewees reported that distraction as a minor issue. Likewise, 97% of Edmodo posts uploaded by students directly referenced the learning topic 'Image of God' and were therefore on task. Previous research identified that distraction from learning while engaging in

microblogging was mitigated by the teacher's instructional guidance (Luo 2015; Gao et al. 2012; Dunlap and Lowenthal 2009b). Within this research I believe that distraction was effectively minimised and a more focused, improved and engaged learning experience encouraged through my planning and management of the following pedagogical strategies:

- Informing students verbally in class and online on Edmodo of the learning objectives pertaining to each homework assignment
- Continuous online monitoring of students' posts and homework assignments
- Bite-sized homework assignments that could be completed within a short timeframe as advocated by Van der Meer et al. 2015 and Bradley et al. 2009.

I also believe that a student's recommendation advising learners to turn off their smartphone notifications during homework assignments, thereby blocking phone calls, text and social media communication, was an effective learning strategy that minimised distraction: 'I was grand. I turn my notifications off when I am doing it [Edmodo homework assignments] because then I will get distracted' (FG 6:4). This strategy, which optimised the device's use to support learning, dovetails with Kaye's (2005) argument that blogging 'is determined by the user, not the technology' (p.75). In summary, examination of the first TAM variable revealed that the majority of students perceived Edmodo as a useful device to support their learning rather than as a distraction from this objective.

The use of Edmodo is only a viable proposition if the device is easy to use. Findings in respect of the second TAM variable recorded that 95% of students perceived Edmodo as an easy to use device. This finding was confirmed by the low percentage of technical challenges (3%) identified by students and the high level of online communication during the initial stage of the research. This finding correlates with similar results from Balasubramanian et al. (2014) and Krutka et al. (2014). Terrenghi et al. (2005) found that the issue of usability was one of the main reasons for the lack of uptake on mobile ICT platforms. I believe that students' perception of Edmodo as an easy to use microblogging platform was underpinned by their regular use of the smartphone. It emerged that 87% of students used their smartphone more than once a day (See Figure 4.3.). Furthermore, the pre-research survey revealed that 90% of students liked to experiment with new

technology. Despite these results, I would contest the assumption that young learners can effortlessly transfer from a personal device to an easy to use learning device. My argument is predicated on Kolb's (2008) identification of a 'digital disconnect' between how students use their smartphone technology within their everyday lives and how they use technology in the classroom (p.1). Within the initial stages of this research, I addressed this 'digital disconnect' by hosting a workshop for students on how to effectively employ Edmodo to support learning. On reflection, I would argue that this workshop may have infused students with sufficient skills, knowledge and confidence to influence their experience and perception of Edmodo as an easy to use technology. Regardless of training, Imazeki (2014) states that 'no technology is perfect' and argues 'How students perceive these technical problems is often a function of how the instructor responds' (p.248). Students responded to my request to immediately self-report on technical problems they encountered within Edmodo. These posts were promptly addressed or resolved by peers or by myself as the teacher-researcher. I would suggest that these strategies in respect of the early identification and prompt addressing of technical problems online may have influenced students' perception.

Within this research, convenience emerged as a clear theme. This finding is comparable to research conducted by Chang et al. (2012) and Yoon and Kim (2007) which identified perceived convenience as a TAM external variable. Students cited both their preference for typing homework on their smartphone rather than writing in copybooks, and the smartphone's portability in supporting mobile learning anytime and anywhere as key components in their perception of Edmodo as convenient. Posts describing students' images of God within their home context such as that depicted in Figure 4.25. highlighted the convenience of Edmodo in supporting learning in informal contexts 'woven into every waking moment, among a myriad of other activities and in all manner of social settings and groups' (Traxler 2008, p.18). Equally Quinn (2013), Gromik (2012) and Hsu and Ching (2012) indicated that smartphones were ideal learning tools due to their convenient accessibility to support innovative learning whenever and wherever desired. Similarly, several students within this research recalled how Edmodo was a positive convenience that offered them an opportunity to connect, communicate and collaborate online anytime or anywhere: 'I remember one time we went to the centre with mam and I was in the car

she had to go so I just did my homework on my phone in the car so it was kind of convenient' (FG6: 1) and 'I would when I was busy just sit down on the couch or hide in the toilet and do the [Edmodo] homework and it was handy' (FG1: 2). These experiences demonstrated that Edmodo facilitated 'stolen moments of learning' that allowed students consume information and construct knowledge beyond the limits of the Religious Education classroom or designated homework area (Metcalf 2002 n.p.). The analysis of the second TAM variable affirmed students' perception of Edmodo as an easy to use and convenient mobile learning microblogging platform.

The third TAM external variable focusing on personal innovativeness disclosed that 90% of students reported a willingness to use new technology. Conversely, I discovered that several students displayed an initial resistance towards the use of Edmodo as my reflective journal outlines:

Although I see them around the school corridors constantly connected to their smartphones, today in class at the mention of this smartphone project, several of the students indicated that they did not want to partake in the research as they were worried and nervous about using their smartphone for learning (Researcher's journal dated 1st of March 2015)

Informal discussions with these students exposed concerns in relation to potential cyber bullying and inability to use the smartphone to support learning. The initial reaction of these students reflects results from research conducted by Thomas et al. (2013), Margaryan et al. (2011) and Judd et al. (2006) which found no evidence to support the belief that young learners had an inherent aptitude for using technology to support learning. The findings challenge the classification of today's young learners as 'Millennial' learners (Howe and Strauss 2000), 'digital natives' (Prensky 2001) and the 'net generation' (Tapscott 1998) who are instinctively equipped for communicating and learning through technology. Several researchers like Bennett et al. (2008) have criticised this classification as lacking in empirical evidence. I would argue that complex learning processes and the diverse personal demography of young individual learner's motivations, perceptions, practices, and abilities should not be constrained by classification or category. Despite the initial resistance to using Edmodo displayed by several students within this research, findings from data analysis of all students' posts during the first two days found high levels of use (See paragraph 4.4.1.). Research

conducted by Mauroux et al. (2014) reported that participants showed resistance towards using mobile microblogging due to anxiety about change. According to Akerlind and Trevitt (1999) initial resistance towards using new technology is to be expected as it causes change that ‘conflicts with students’ past educational experiences’ (p.96). I would agree that this explanation may account for the initial resistance several students experienced. Findings indicated that Edmodo was a new technology that students had not employed prior to this research. Even though no students had used Edmodo, the fourth TAM variable ascertained that smartphones were popular devices that they regularly used within their daily lives.

The fourth external TAM variable calculated students’ accessibility to and usage of their smartphone. Accessibility and regular usage may support a smoother transition from the use of a smartphone as a learning device as opposed to a personal device. Findings showed that 94% of students owned their own smartphone. As already outlined, 87% of students reported that they used their smartphone several times or continuously on a daily basis (Figure 4.3.). This finding affirms results from a recent survey that revealed 43% of young Irish people, between the ages of eleven and sixteen, reported ‘two or more experiences associated with dependence and overdependence on their smartphones’ (O’Neill and Dinh 2015, p.61). These findings relate to what Oulasvirta et al. (2012) recognise as ‘checking habits’, characterised as ‘brief, repetitive inspection of dynamic content quickly accessible on the device’ (p.105). Page and Thorsteinsson (2014) view these checking habits apparent among smartphone users as evidence of emotional attachment to smartphone devices. For many young people smartphones are intrinsic to their 21st century lifestyle as Rideout et al. (2010) observe:

One of the most striking changes in the media landscape over the past five years has been the explosion in cell phone ownership and usage among teens... the image of a teenager with a cell phone glued to her fingertips, either texting away furiously, listening to music, playing games, or watching videos, has become almost iconic (p.18).

In summary, the TAM instrument, specifically designed for measuring the experience and perception of Edmodo, provided detailed insight. The research question ‘What were our experiences of smartphone microblogging supporting mobile learning on ‘Images of God?’ revealed that the effective employment of Edmodo facilitated by the

implementation of several teacher and learner strategies, mainly derived from testing recommendations of previous research. I will outline these strategies as recommendations in the following chapter (See paragraph 6.4.). The research revealed that students experienced minimal technical challenges and distraction from learning. Overall, Edmodo was perceived as a useful, useable, flexible, convenient, safe and accessible tool for mobile learners.

5.3. The learner aspect

Analysis of our experience of Edmodo in supporting the learner aspect of mobile learning implicated the following themes:

- Cognitive learning
- Collaborative learning
- An online learner centred learning management system
- Reflection

5.3.1. Cognitive learning

Cognitive learning involved the testing of students' understanding of four basic concepts from the Junior Certificate Religious Education syllabus module 'Images of God', before and after they participated in this research. Although these tests involved a limited examination of cognitive knowledge, the results revealed a 43% increase in test scores when the outcomes in the post questionnaire were compared to those of the pre questionnaire (See Figure 4.11.). Similarly, the reviewed research conducted by Junco et al. (2013) recorded that Twitter helped to advance cognitive learning as confirmed by students' improved academic grades. These findings concur with previous research results which found employing mobile devices like smartphones improved cognitive mobile learning (Fernández-López et al. 2013; Hwang et al. 2011; Shih et al. 2010). However, they contradict research conducted by Kimmons (2015) that found online systems, like Edmodo, do not significantly impact on students' cognitive learning. I would argue that students' cognitive learning was supported by online active participation through creating, communicating, collaborating and critiquing posts on Edmodo.

Within this research 12% of students who initially signed up to Edmodo were identified as lurkers as they did not upload any posts. An informal chat with these students revealed that although they did not write posts, they did however read peers' posts on Edmodo. These students were not interviewed formally within this research. I believe that an investigation as to why they did not actively participate on Edmodo would conflict with the ethos and ethics of PAR methodology. Previous research discovered that students who actively engage in ICT collaborative projects were uneasy about receiving negative feedback from peers or not receiving any feedback at all (Ellison and Wu 2008) and questioned whether peer feedback was of value to their learning (Halic et al. 2010). Educational theorists such as Fröbel, Dewey, Montessori and Piaget claimed that actively experiencing and engaging in learning strengthens cognitive learning. However, Beaudoin (2002) argued that the minimal online participation by these online lurkers does not compromise academic grades. Beaudoin (2002) argues that lurkers spend less time actively communicating and constructing knowledge and therefore have more time to consume, process and reflect on the information presented. I acknowledge that online platforms such as Edmodo offer more educational opportunities for lurkers, in comparison to standard classroom interactions, as they can access, read and reread both textual and visual posts anytime and anywhere they desire. This allows them to engage in a one way individual construction of information which can result in the advancement of their own cognitive learning.

The assessment and grading of lurkers' online learning, or the lack thereof, is challenging. Dennen (2008) reported that although lurkers leave 'electronic traces...such data can be unreliable measures of true lurking' (p. 1627). Lurkers therefore could be disheartened by the learning experience within online learning such as their passive learning is usually not assessed or graded. Yet how can teachers effectively assess or grade lurkers' online learning? I acknowledge that lurking is a normal learning activity where passive learners witness peers actively participating within standard offline class interaction. As this research was rooted in an ethical code based on voluntary participation, I further acknowledge that the assessment or grading of students' posts within this research was not prudent. I would argue that future assessment and grading of online activities, such as the quality and quantity of Edmodo posts uploaded by individual users, could possibly

materialise in the context of post primary education. My argument correlates to the recent 2016 Leaving Certificate English paper that challenged students to write a blog (McGuire 2016). Previous research recommended that posts uploaded onto microblogging platforms should be a compulsory component of a graded learning task (Kassens 2014; Junco et al. 2013; Dunlap and Lowenthal 2009a). Likewise Rinaldo et al. (2011) discovered that students did not upload posts onto the microblogging platform Twitter for the very reason that their learning activity was not linked to their grades. Ebner, et al. (2010) indicates that the assessment and grading of mobile microblogging, embedded within a specific curriculum module and linked to learning objectives, increased participation and motivation among users. Junco et al. (2013) discovered that using Twitter as a course requirement, integrating Twitter in relevant ways and using theory based pedagogy that supported the teacher's regular online communication with students, resulted in increased learning engagement and improved grades. On reflection, I would argue that smartphone microblogging posts should be assessed and graded for quality and quantity. This may encourage active online learners to produce a higher standard of work and entice lurkers to actively participate online, thus advancing their cognitive learning.

I would argue that students use of both textual and visual channels of communication in constructing and communicating their images of God within Edmodo may have strengthened their cognitive learning. My argument relates to Paivio's (1986) dual coding learning theory claims that cognitive learning is strengthened and sustained through coordinated engagement with the auditory-verbal and visual mental channels of information available in multimedia platforms like Edmodo. In the general context of textual and visual affordances, this research does not confirm or contest whether cognitive learning results were improved by students' engagement with Edmodo's verbal and visual channels. This would involve investigating cognitive neuroscience and cognitive psychology which are beyond the scope of this research. Nonetheless, it was established that 91% of respondents enjoyed looking at their peers' textual and visual based posts on Edmodo. Interestingly, videos created through the Animoto smartphone app by eight individual students received no replying comment from peers. Furthermore, 31% of direct feedback, in relation to posts containing visuals depicting personal images of God, consisted mainly of compliments (See paragraph 4.5.2.). I would suggest that these visual

drawings, photographs and videos may have acted as learning ‘hooks’ encouraging learners to engage and explore posts on Edmodo. In short, Edmodo advanced students’ cognitive learning of ‘Images of God’ through its support of active participants and lurkers as well as its textual and visual channels of communication. Cognitive learning was advanced by Edmodo’s support of collaborative learning.

5.3.2. Collaborative learning

Blogging can effectively support collaborative learning through ‘peer support networks’ (Killeavy and Moloney 2010, p.1070). Within this research, findings revealed that Edmodo’s social interactive networks were perceived as supporting collaborative learning through peer scaffolding, active and inclusive collaborative interaction. The majority of students perceived that Edmodo’s collaborative learning had advanced their cognitive learning (See paragraph 4.5.2.). This finding coincides with previous research that established cognitive learning was advanced through microblogging’s collaborative learning environment (Carpenter and Krutka 2014; Junco, et al. 2013; Junco et al. 2011). Within this research, collaborative learning advanced the online class group’s ‘distributed knowledge’ (Gee 2004, p.78). This ‘distributed knowledge’ was made possible through students’ presentations, communication and discussion on Edmodo’s transparent and open online platform Equally Edmodo’s transparent and open online presentation of individual students’ images of God may also have provided an opportunity for some students to copy and paste posts and present them as their own work (See paragraph 4.5.3.). Kauffman and Young (2015) label copying and pasting within online platforms as ‘digital plagiarism’. ‘Digital plagiarism’ was also identified by Krutka et al. (2014) who discovered that several participants uploaded similar posts and duplicated discussions thus ‘comments and replies could feel redundant and burdensome’ (p.91). According to Igo and Kiewra (2007) teachers should encourage students who use copy and paste online to engage in a more authentic learning experience though a note-taking framework that encourages students to engage in ‘more selective pasting’ (p.513). I would argue that although students’ cognitive learning was limited to surface learning using copy and paste methods online, these methods may still have advanced students’ cognitive knowledge of ‘Images of God’. I believe that my argument may be especially

justifiable with regard to the participating SEN students who may have found engaging in deeper learning too challenging.

Edmodo's collaborative learning supported peer scaffolding through collaborative online learning conversations. Findings revealed that 97% of students' posts were involved in collaborative learning conversations on 'Images of God' with peers and myself as the teacher-researcher. Peer scaffolding through collaborative learning conversations and feedback involving praise, questions and opinions offered opportunities for students to drive, direct, reflect and query their individual images of God beyond the limits of their own past knowledge. Often peer scaffolding generated new knowledge and perspectives resulting in statements like 'I never thought of it like that' (See Figure 4.16.). Peer scaffolding is situated within the Zone of Proximal Development (ZPD). This theory posits that students can independently and socially construct new knowledge through support from more knowledgeable peers (Vygotsky 1978). Within this research, ZPD was evident in several conversations. For example Figure 4.18. and 4.21. illustrate peers' comments supporting and constructing new knowledge on 'Images of God' through Edmodo's collaborative conversations. Additionally, 46% of students' posts replying to peers, praised individuals on their specific image of God. I consider that engaging in peer scaffolding through praise can potentially support cognitive learning. Praise can validate information created, communicated and uploaded on Edmodo by peers. Yet findings indicated that peer scaffolding was limited as the majority of questions asked by students were lower order questions. Most students therefore did not disagree with or critique peers' posts. In general this research recorded that peer scaffolding was non-critical and non-confrontational. This result may relate to Krutka et al. (2014) research who found that although 67% of students felt comfortable disagreeing with peers' posts on Edmodo, they seldom did so. Alternatively, I would argue that this low percentage of non-critical, non-reflective and non-confrontational questioning is to be expected among young learners within their class group as they may not want to critique peers on personal and sensitive topics like 'Images of God'. My experience within the classroom suggests that students rarely ask questions of peers mainly due to a lack of self-confidence and fear of derision. Nevertheless, questioning through peer scaffolding followed up by considered answers is important for advancing cognitive learning (Buckner and Kim 2014; Nystrand

1997). Edmodo's collaborative learning supported peer scaffolding through active and inclusive collaboration.

Analysis of the research shows that Edmodo supported active and inclusive collaborative learning. Active collaborative learning was evident in that 88% of students who initially signed up for this research actively posted on Edmodo. Findings recorded an average of eleven posts per student. These findings concur with Chuang (2015), Rankin (2009) and Masters and Oberprieler (2004) who argue that online platforms usually engage more active participation in comparison to standard classroom interaction. Research conducted by Oblinger and Maruyama (1996) established that 10% of students dominate classroom interaction. Research undertaken by Dillon (1988) found that some students did not actively participate in classroom due to fear of negative feedback from peers and teachers. In contrast, Chen and Chen (2012), Junco et al. (2011) and Vonderwell (2003) found that online platforms encouraged inclusive participation by fostering uninhibited communication among introvert students. Mc Neal and Van't Hooft (2006) maintained that the portable phone may be the learning tool that increases inclusiveness in education by eliminating hierarchy and liberating learning from fixed places, times and resources. This research found that Edmodo facilitated an inclusive learning place where students 're-create knowledge as equal partners' (Tzibazi 2013, p.158). This argument was confirmed by a student reporting that Edmodo provided a space for him to express his opinions which were often not possible to voice off line:

People usually do not agree with me in normal life so I found it interesting looking online because people do not really talk to me in school, online I find it a bit better. (FG2:3).

This student's report indicates that Edmodo facilitated inclusive online communication that created 'a more emancipatory context than traditional [offline] forums have allowed' (Ross and Chiasson 2011, p.131). Edmodo's support of inclusive communication offered the 'ideal speech situation' that fostered an unlimited and diverse communication and expression of images of God including agnostic and atheist worldviews (Habermas 1987) Students perceived Edmodo's active and inclusive collaborative learning as an enjoyable activity as 'you got into a kind of conversation with them about God and then other people join in on the conversation and it was more interesting' (FG2:1). Some students felt that

Edmodo's support of a more open and transparent communication, displaying all students' work within the class, encouraged them to produce a higher standard of work:

Yes that [Edmodo] made me put in more of an effort because I do not like when people think I am stupid or something ...if the teacher sees my homework and I did not put in such an effort I would not mind because it is just one person but if the whole class is seeing it I put in more of an effort to make myself look smart (FG 2:4)

Conversely, this research also recorded several examples of poor writing as students used text message jargon, abbreviations, cyberslang, and emojis within posts. This finding affirms Grosbeck and Holotescu's (2008) argument that microblogging can foster bad grammar due to its 140 character limit. Although Edmodo does not have a character limit most posts did not exceed Twitter's 140 character limit. I argue that shorter posts or microblogs with a limited number of characters may in fact have encouraged high levels of collaborative learning conversations centred on 'Images of God' through its succinct communication. The high level of collaborative online learning conversations centred on 'Images of God' within this research contradicts Parcha's (2014) argument that students' offline connection with peers outside of the classroom 'is rarely centred on classroom material' (p.229). In summary, this research established that Edmodo supported an effective collaborative active and inclusive learning experience facilitated by peer scaffolding centred on the Junior Certificate Religious Education module 'Images of God'. On reflection, I maintain that collaborative learning was also facilitated through Edmodo's online student-centred learning management system.

5.3.3. Online student-centred mobile learning management system

Edmodo supported an online student-centred learning management system that offered a mobile platform for managing learning resources and homework assignments and for facilitating seamless learning. The research found evidence of students using Edmodo's online learning management system for uploading, viewing, sharing and storing multimedia learning resources such as digital photographs and videos created through the smartphone app Animoto. I employed the system for creating and communicating instant reminders to students of the due date for homework assignments. It was also demonstrated that Edmodo's online learning management system facilitated seamless learning. Likewise, the reviewed research in chapter two found evidence of Edmodo's support of seamless learning or learning extended beyond the limits of timetabled class time or the

designated classroom (Evans 2014; Junco et al. 2013; Junco, Heiberger et al. 2011). Looi et al. (2010) describes seamless learning as learning that ‘bridges private and public learning spaces where learning happens as both individual and collective efforts and across different contexts’ (p.156). Within this research, several students acknowledged Edmodo’s support of seamless learning as ‘a good thing because if you missed a class ... you could just ask on Edmodo what was our homework?’ (FG 2:1). For me, as teacher-researcher, the support of seamless learning through regular monitoring of students’ posts and scaffolding learning through prompt online feedback was extremely time consuming. Edmodo’s facilitation of ‘always on’ seamless learning generated ‘iTime’. ‘iTime’ is the continuous 24/7 online connection to social networks, like Edmodo, that ‘challenges the pre-internet boundaries between public and private, day and night, work and leisure, space and time work to seep into every nook and cranny of personal life’ (Agger 2011, p.120). Edmodo’s iTime capability offers the opportunity of individualised online feedback unlike traditional off line classrooms where feedback is difficult to offer to individual students due to class time restrictions (Filiz et al. 2014; Wissick and Gardner 2008). I found that managing students’ learning on Edmodo regularly interrupted my personal private time. Notification of incoming posts were ‘regularly ringing from my smartphone Edmodo app’ (my research journal, dated March 17th 2015). Brett (2011) and Sharples (2006) research highlighted these interruptions and intrusions from mobile technologies produced negative effects on the personal lives of both students and educators. In spite of these interruptions and intrusions I argue that Edmodo’s support of seamless learning can extend and expand the formal learning experience of the classroom. Edmodo’s online student-centred learning management system that supported iTime capability enhanced students’ cognitive learning. Cognitive learning was also advanced through the employment of Edmodo to support student reflection.

5.3.4. Reflection

The evidence suggests that students’ employment of Edmodo supported the four distinct criteria of reflection rooted within Dewey’s works: *Democracy and Education* (1944), *Experience and Education* (1938), *How we think* (1933), *The relation of theory and practice in Education* (1904) as classified by Rogers (2002). These criteria are as follows:

1. A meaning making process
2. A systematic reflecting process
3. A process that takes place within a community
4. A process that values personal and intellectual growth of individuals and communities

Furthermore, evidence from the findings also reveals that students' employment of Edmodo supported different levels of reflection; as empathetic, systemic, self and transcendental reflection was apparent (Carroll 2010, p.26). A meaning making process engages the learner in a deeper understanding of their connection with information. This process can result in students constructing new knowledge or meaning making. Within this research students engaged in the process through communicating and comparing their own image of God with peers' images. This process often triggered reflection which occasionally resulted in a deeper personal understanding of their image of God. For example, when a student explained on Edmodo that 'God gave us a blank canvas to draw him in any way we like' a peer replied stating 'I never thought of it like that. I agree!' (See Figure 4.16.). This online conversation identified the moment where a student reflected on information presented by a peer which resulted in a deeper personal understanding of God. Within this research evidence of deep learning or meaning making through reflection was limited as the majority of posts reported descriptive explanations of their images of God. This finding is similar to Ebner et al. (2010) who discovered participants' use of microblogging for supporting learning was non-reflective. Krutka et al. (2014) also revealed that although the majority of research participants perceived the microblogging platform Edmodo as a valuable collaborative reflection learning tool, nearly 70% of posts were descriptive in nature. Although Mauroux et al. (2014) found that smartphone digital photographs effectively prompted 'apprentices to review the pictures and become aware of mistakes, imperfections or successes ...and reflection' (p.219), there was, in reality, little evidence of deep critical reflection. Mauroux et al. (2014) identified that regular and robust feedback from teachers in the support of students' deep critical reflection is vital. Within this research I provided feedback to students by the use of lower order questions in respect of the image of God they had posted. On reflection, I acknowledge that posing additional higher order questions to students on their images of God may have advanced deep critical reflection. Reflection is not a spontaneous activity but a systematic process that necessitates planned learning

activities and pedagogical strategies (Taylor and Freeman 2011; Nückles et al. 2009). Planning of homework assignments, feedback on students' posts, post surveys, post questionnaires and focus group interviews facilitated both reflection- in-action and reflection-on action (Schön 1983). Homework assignments encouraged students' reflection-in-action through the creation of textual posts on their personalised images of God. This action encouraged students to reflect through the process of writing and creating a visual for their post. Furthermore, reflection-on-action was facilitated through feedback in the form of praise, questions, agreeing or disagreeing, post surveys, post questionnaires, homework assignments and focus group interviews. For example, a final homework assignment asked students to draw their image of God, upload it onto Edmodo and explain if their image had changed. This assignment prompted students to think, revisit and often revise their initial image of God. Reflection-in-action and reflection-on-action can often lead to the construction of new knowledge or meaning making. Within the post survey 71% of students reported that they reflected on their image of God during the research, with 45% of students recording that their image had changed or transformed since they started this research (See paragraph 4.5.4.). These findings relate to similar research which recorded that Twitter (Domizi 2013; Wright 2010) and Edmodo supported reflection (Krutka et al. 2014; Mills and Chandra 2011). This systematic reflecting process took place within Edmodo's learning community.

The reflection process occurs within a learning community. This criteria affirms the connectivist learning theory that underpins my pedagogy. Connectivism posits that learning takes place through online networks of connections where information is communicated, consumed, created, accepted, validated, answered, rejected or exchanged (Downes 2006; Siemens 2005) (See paragraph 2.3.1.). Edmodo supported to a limited extent reflection through connected networks within a community where peers offered feedback through questioning, opinions and agreement as detailed in the following online conversation in Figure 5.1.:



Figure 5.1.: An example of reflection within an online conversation on Edmodo from class group 3, dated 14th of April 2015

From this online conversation the reflection process is evident through the online community of students sharing opinions and asking questions on their experience of God. This online conversation also revealed that empathetic, systemic, self and transcendental reflection were evident (Carroll 2010, p.26). ‘Systemic reflection’ was evident as students looked at and reflected on the wider picture that included concepts such as creation and evolution. This conversation also revealed ‘empathetic reflection’ in that a student showed empathy towards another student’s perspective (Carroll 2010, p.26): ‘it kind of makes sense as if you don’t believe in God, why would you have an image of God in your head’ (See Figure 5.1.)

Reflection appreciates the value of personal and intellectual growth. Within this research the post questionnaire indicated that 59% of students had thought about how their image of God affected or influenced their life and behaviour; 'I think my image of God affects my life in to do more community work, to look at for more people and start helping more' (PQ30). In comparison, the pre questionnaire revealed that 22% of students had thought about how their image of God affects or influences their life and behaviour (See paragraph 4.5.4.). This shift in thinking or reflection shows a growth in self-awareness as to how an image of God affects students' relationship with self, others and the transcendental Other which may or may not include God. Carroll (2010) identifies this type of self- reflection as self and transcendental reflection involving an awareness of one's self in relation to the transcendental that entails reflection on the meaning of life. Evidence shows that various types of reflection - empathetic, systemic, self and transcendental - were supported through students' participation in conversations within Edmodo's online learning community. Reflection often resulted in students filling in their gaps of knowledge on curriculum concepts through communication resulting in 'shared interpretation' (Keaton and Bodie 2011, p. 193), as evident in the following student's account:

It kind of brought you in deeper that you actually saw other people have different opinions on image of God and you might not have seen this in your own image of God (FG2:1).

This sentiment relates to Richardson's (2010) argument that online blogs facilitate collaborative cognitive learning through 'all sorts of reflection ...that was previously much more cumbersome' offline (p.27). Although the majority of posts within this research were limited to surface or descriptive reflection, a limited number of posts from students did indicate deeper reflection, as one student identified:

I liked it because my original image of god was shifting every time I saw someone else's it was changing as I have seen other people's projects (FG3:2).

This finding supports Davidson's (2011) argument that technology assists us in seeing aspects of our human relationships and behaviours that can lead to deeper and more accurate knowledge.

In summary, the findings uncovered that our experience of employing Edmodo supported the learner aspect of mobile learning in the following ways:

- Cognitive learning through textual and visual channels of communication
- Engagement of both active and ‘lurking’ online participation
- Collaborative learning enabling peer scaffolding
- Inclusive online learning
- An online student-centred learning management system
- Seamless learning
- Reflection-in-action and reflection-on-action (Schön 1983)
- Support of the four criteria for reflection (Rogers 2002)
- Support of empathetic, systemic, self and transcendental reflection (Carroll 2010)

Consequently, I would conclude that our employment of Edmodo provided a valuable learning platform that enhanced, expanded and extended post primary Religious Education beyond the traditional classroom encounter by offering students a more engaged and empowering learning experience. The learner aspect was facilitated by Edmodo’s support of the social aspect of mobile learning.

5.4. The social aspect

Learning is essentially a social process that reflects ‘our own deeply social nature as human beings capable of knowledge’ (Wenger 1998, p.3). Afdal (2015) understood the teaching and learning of school-based Religious Education as ‘social practices, rather than sums of individual cognition’ (p.256). Within this research the social aspect of mobile learning complemented the participating ‘Net Generation’ students who regularly connected to social networks (Evans 2014, p.903). The following themes emerged from data analysis of the social aspect of mobile learning:

- Pedagogy
- A virtual learning community
- A safe space

5.4.1. Pedagogy

Pedagogy plays a vital role in the effective integration of technology within classroom learning (Duarte 2015; OECD 2015; Cochrane 2014; Hopkins 2012). The effectiveness of the smartphone in supporting learning hinges on pedagogy, as ‘the quality of student learning is ...related to the quality of teaching’ (Angelo and Cross 1993, p.1). Although the literature review in chapter two did not reveal an in-depth comprehension of pedagogy supporting mobile microblogging, a ‘theoretically driven pedagogical basis’ was deemed necessary for the effective integration of microblogging into learning (Junco et al. 2013, p.274). Consequently, I chose Salmon’s (2003) five-stage scaffolding model for guiding my support of students’ employment of Edmodo (See paragraph 3.8.). Within the stages of this model, my posts centred on outlining homework assignments, addressing technical challenges and scaffolding learning through asking prompt, regular and individualised lower and higher order questions as recommended by previous research (Mauroux et al. 2014; Junco et al. 2013; Ebner et al. 2010; Chen et al. 2009). Black and Wiliam (1998) established that teachers’ effective frequent and formative feedback, such as asking questions, improved students’ cognitive learning. The importance of questioning within teaching was highlighted by Ross (1860 cited in Ness 2015) as ‘to question well is to teach well’ (p.9). The findings revealed that only 14% of questions I asked were higher order questions (See paragraph 4.6.1.). This finding is similar to Wilen’s (1991) research which revealed the majority of teacher’s questions asked were lower order questions. I planned to use Bloom’s reviewed taxonomy as a basis for asking lower and higher order questions. I hoped that my asking of higher order questions in particular would help students critically reflect on their ‘Images of God’ which would result in a deeper personalised learning experience. On reflection, I believe that the support of smartphone microblogging necessitates clear planning and a balance of lower and higher order questions, ideally within a small online group. A small group allows more time for constructive and formative feedback to individual students through a balance of lower and higher order questions. Despite this missed opportunity for promoting deeper learning supported by higher order questions, my feedback was perceived by 94% of students as beneficial to their learning.

Reflection on my pedagogical process highlighted challenges concerning my use of a social constructivist pedagogy. I would argue that social constructivism ignores the influencing factors that shape individual learning experiences such as the students' learning strengths and weaknesses. This research involved some students that I had previously taught. My insight into these students' individual learning strengths and weaknesses may have constrained my feedback to individual students as recorded in my reflective journal:

Having been the RE, SPHE and music teacher to two particular classes over the past academic year, I have a fair insight into the individual learners' strengths and weaknesses. Having just looked over Edmodo posts last night, I am delighted to have come across a few surprises. Over the past academic year student X and Y have rarely spoke up in class. Both students have moderate learning challenges and therefore have found understanding various concepts in the past challenging. Also they lack confidence and never contributed to class discussions or even answer my questions. However looking at their posts on Edmodo I realised that this experience has given them a voice. Student X has posted 10 posts and student Y has posted 27 posts. I have identified in my posts that I have praised both students and awarded them badges but I have shied away from asking them questions, scaffolding them for fear they might not know the answer and thus deplete their new found confidence and voice – is this my bias controlling my feedback? Was my position as an insider researcher limiting? (Reflective journal, dated April 3rd 2015)

Another challenge posed by my use of social constructivist pedagogy stemmed from a student's suggestion in the focus group interviews that I should have been more 'involved' in students' online discussions (FG2:1). On reflection, I realise that supporting smartphone microblogging rooted within a student-centred connectivist and social constructivist pedagogy, underpinned by a PAR methodology, destabilised my traditional teacher's role as the locus of control. Through facilitating and managing Edmodo's 'fragile ecology' (Merchant 2009, p.54), I noted the pedagogical shift towards the 'breakdown of conventional hierarchies that affirmed students' agency as knowledge producers' within Edmodo's virtual learning community (Stephansen and Couldry 2014, p.1212). Through critical reflection, I recognised that assumptions about power in relation to my pedagogical practice and its relationship with students' learning processes within Edmodo, made me appreciate the challenges of the shift from 'sage on the stage' to 'guide on the side' (Prensky 2008). I would argue that being a 'guide on the side' supports a stronger self-management and self-awareness approach to learning that may help students to 'be better prepared to meet the challenges of life beyond school' (DESb 2015, p.36).

On reflection, I recognise the pedagogical value of engaging in this research has promoted a deeper understanding of my vision, values and practice as a Religious Education teacher. As a reflective practitioner, I realise that this experience of smartphone microblogging promoted my pedagogical values by fostering an openness and respect for diversity, democracy and a willingness to engage and empower students to become active learning agents and co-creators of knowledge. Within my future teaching practice, I plan to improve my use of smartphone microblogging to support mobile learning by managing a smaller class group which may allow time for the careful planning of higher order questions for students. My pedagogy involved my support of students' mobile learning within Edmodo's virtual learning community.

5.4.2. A virtual learning community

Edmodo supported a positive and productive virtual learning community (See paragraph 4.5.3.). The findings confirmed that students felt a sense of community within Edmodo as evident from the positive affirmation which encouraged and empowered students to participate as the following student explained:

I was worried about what the people might say but everyone else was posting their own image of God so everyone was nice to each other, no one really made fun of each other's images of God. (FG3:5).

Similar findings were recorded in previous research investigating the potential of Twitter for supporting an online virtual learning community (Carpenter and Krutka 2014; Loureiro-Koechlin and Butcher 2013; Gruzd et al. 2011; Zappavigna 2011). Rovai (2001) argues that it is 'the sense of community that attracts and retains learners' (p.109). Within this research, Edmodo supported the sense of community through promoting interpersonal relationships. 77% of students claimed that they gained a deeper understanding of each other through Edmodo as reiterated by an interviewee: 'You knew them well but if you did not know them like [student X] we got to know him more and his images and the way he was texting his answers to the questions' (FG 2:3). This finding relates to Tuckman's (1965) stages of development within working groups. As students had already forged social relationships within their class groups, I would argue that the 'forming' and 'storming' stage involving students getting to know each other, that sometimes entailed initial testing and conflict, had previously been established (Bonebright 2010; Tuckman and Jensen 1977; Tuckman 1965). My argument may be

reinforced by the sparse evidence of colloquial chats during the initial stage of this research. Hsu and Ching (2012) and Ebner et al. (2010) recognised that these chats containing spontaneous social exchanges of trivial information often glued the online community together. The ‘performing stage’ of Tuckman’s (1965) stages of development was evident among class groups who connected, conversed and critiqued each other’s ‘Images of God’ within Edmodo’s safe space.

5.4.3. A safe space

Edmodo offered a safe space for students’ self-disclosure of their personal images of God and spirituality. This research identified that Edmodo supported a safe space for students to self-disclose their personal images of God including agnostic and atheist worldviews. Self-disclosure is making public private and personal information about oneself (Joinson 2001; Derlega et al. 1993). Several students perceived that self-disclosure of their personal images of God was easier on Edmodo in comparison to the face to face communication within the classroom; ‘If it was not online, people would be afraid to say what they wanted to say if it was bad’ (FG3:1) or ‘maybe people would have not said it out loud in class as they might be thinking it is embarrassing’ (FG2:4). Similar findings from Lee (2009) discovered that blogs effectively supported participants seeking a ‘timelessly and placelessly’ connection with God or spirituality beyond the customary way of the established church community (p.99). These finding relates to Schouten et al. (2009) who established that computer mediated communication (CMC) facilitated four influential factors; self-presentation, similarity, self-awareness and direct questioning. These factors encouraged users to engage in higher levels of self-disclosure online than were feasible in face-to-face communication. I would argue that students engaged in all four influential CMC factors through their use of Edmodo. 88% of students voluntarily engaged in self-disclosing and communicated similarities through comparing, contrasting, conversing and reflecting about their personal images of God on Edmodo. The findings from the post-research survey recorded that 71% of students reflected on their images of God during this research. This survey also discovered that a number of students who did not have an image of God stated that they did not believe God existed; ‘I am a humanist so I believe in that instead of getting goodness and loyalty from God and prayer, we could find it through each other in love’ (PS9) and ‘I do not believe in

God I am an atheist' (PS79). These findings are comparable to research conducted by Clark and Dierberg (2012) on digital storytelling which also recognised that technology provided a safe place for students to share their personal faith stories that previously were concealed and censored. Findings indicating high levels of self-disclosure in Edmodo are however contrary to Bobkowski and Pearce (2011) research that found that the majority of participants who displayed their religious identity online did not engage in deep personalised reflective self-disclosure. Similarly students' self-disclosure and dialogue on Edmodo on their personal images of God is in contrast to Smith and Snell's (2009) research which suggests that a cohort of young people are uncommitted and indifferent to religion and therefore may not disclose or discuss their religious identities off line or online. The findings reported that students identified that discussions about God in previous conventional timetabled classes within post primary and primary schools did not facilitate self-disclosure of or debate on their personal images of God (See paragraph 4.6.3.) The research established that Edmodo offered students a safe place for self-disclosure as well as 'a constant ceaseless creation and exchange of meaning' on their personal images of God (Holquist 2002, p.41). These findings relate to research conducted by Mc Quiston (2007) on the use of technology within a Lutheran confirmation program that promoted a more 'deeply immersive' mindful and personal experience (p.100). I would argue that the self-disclosure, allied to the creation and exchange of meaning on images of God including agnostic and atheist worldviews, points to students making inward connections to the self, others and the transcendental Other which is often identified as spirituality. I would conclude that Edmodo provided a safe space for students to connect with their innate spirituality. As discussed above, students connected to their religious spirituality through the process of participating, identifying, reflecting and connecting their images of God in their lives, and to the non-religious spirituality consisting of agnostic and atheistic worldviews, through Edmodo. It offered the opportunity of a safe space for students to engage in self-awareness, self-discovery and on occasion, transformation regarding their spirituality. This opportunity to connect to the transcendental is often not possible through off line modes of communication like textbooks as articulated by the following student:

Then during the thing [this project] I realised that I was agnostic... I started thinking about the world and life and how bad things happen and everything. I still believe in the afterlife, I just do not believe in God...that is not an everyday thing you would think about, like when you were doing images of God, you are thinking about really everything. I just came to my senses and that is what I thought... I thought about it over and over but if was just textbook I would be just feck that! (FG6:3).

This student's statement identified that posting, reading and interacting with peers on Edmodo led to a realisation that she was agnostic, a process she believes could not have materialised through off-line textbooks. The statement confirms Daily's (2013) argument that 'Mobile technology offers a religious and spiritual learning intimacy, a deep penetration into the daily lives of the public that is not possible in formal learning contexts'(p.124).

O'Connell (2012) views spirituality 'as central to every educator (indeed every person) no matter who they are, where they work or who or what they teach' (p.122). Following on from O'Connell's viewpoint, Erricker et al. (1997) argue that teachers are doing a 'disservice' to students' learning by not educating them about their spirituality (p.189). Holt (2015) argues that 'spirituality lies at the heart of religious education' (p.38). From my experience of teaching Junior Certificate Religious Education I feel that there is an emphasis placed on cognitive learning or 'learning about religion' that results in little or no time for engaging students in deeper learning that can potentially facilitate a connection to their spirituality. A small-scale study of a number of ETB post primary schools confirmed my sentiments as it found 'many of the schools no longer cater for the faith or spiritual development of the variety of students' (Mullally 2013, p.18). This failure to cater for the spiritual development of students falls short of the Junior Cycle objective that aims to contribute to the 'spiritual health' of students' wellbeing (DES 2015b, p.54). On reflection, I recognise that Edmodo offered an opportunity for supporting students' self-disclosure, self-awareness, reflection and 'critical evaluation of their beliefs and values' in relation to a personalised image of God (Grimmitt 1987, p.141). Our experience of Edmodo therefore implicitly opened up an opportunity for students to connect with their spirituality. Edmodo provided a safe place that addressed the aim of post primary Religious Education to provide a holistic learning experience promoting 'wide awakesness' of the head and heart by engaging learners in collectively connecting, constructing and collaborating across the many diverse contexts of their lives

to create their own personalised unique knowledge (Greene 1988). Edmodo offered a space for students to reflect on their diverse personal images of God within a safe and positive online learning community. This reciprocal sharing of sentiment may have fostered a sense of mutuality. Mutuality is a characteristic of Christian Religious Education that ‘necessitates a joint process involving one’s encounter, acknowledgement, dialogue and collaboration with the other’ (Kieran 2013, p.27).

Consequently, the students’ use of Edmodo can be classified under SAMR (Puentedura 2013) modification stage as Edmodo’s technology was employed to support self-disclosure of their ‘Images of God’. Various students reported that self-disclosure would not occur within the conventional offline classroom. Furthermore, the findings demonstrated that our employment of Edmodo realised the redefinition level of the SAMR model (Puentedura 2013), by providing a safe place for students to self-disclose, to promote a sense of mutuality and to connect to their spirituality.

In summary, the following themes emerged:

- Pedagogy based on social constructivist and connectivist learning theories
- Providing feedback through lower and higher order questions
- Creating a positive sense of community
- A safe space for students’ self-disclosure
- A safe space that fostered an understanding of mutuality
- A space that offered the potential to connect with one’s spirituality

Our experiences revealed that our employment of Edmodo enhanced and extended post primary Religious Education beyond the tradition classroom. This encounter offered students of post primary Religious Education a more engaged and empowering learning experience that encourages participation, learning relevant to their lives ‘inclusive of all students and contributes to equality of opportunity’ (DES 2012a, p.4).

5.5. Summary

This chapter focused on interpreting the findings. Our experiences and perceptions of Edmodo were analysed in the context of the three aspects of mobile learning (Koole 2009). Edmodo was perceived and experienced as a useful, useable, flexible, convenient, safe and accessible learning platform for students. It supported students' cognitive learning or 'learning about religion' through their engagement in collaborative learning supported by peer and teacher scaffolding and Edmodo's online student centred learning management system. Edmodo supported the students' 'learning from religion' through their articulation, communication and reflection on their personal images of God. Edmodo offered a safe place for students to self-disclose their personal images of God that may have fostered an understanding of mutuality. Its safe place presented an opportunity for some students to connect with their spirituality. Chapter six will draw conclusions and offer recommendations on using smartphone microblogging for supporting mobile learning within the context of post primary Religious Education.

Chapter 6: The reflection stage: Conclusions and recommendations

6.1. Introduction

This chapter presents a brief summary of this PAR research. The conclusions outlined are predicated on insights derived from the findings. The implications of these conclusions, in relation to the role of smartphone microblogging in the future support of mobile learning, form the bedrock of a series of recommendations for teachers to consider. This chapter concludes with an outline of how this research contributed to the formulation of new educational knowledge.

6.2. Summary

This PAR research explored the experience of smartphone microblogging in supporting mobile learning of The Junior Certificate Religious Education Module 'Images of God'. I, as teacher-researcher, and a cohort of first year post primary students acting as participating co-researchers, provided data on our experiences in generating the findings. This research was founded on the Kemmis and McTaggart (2005) AR cycle and consisted of planning, action and observation and reflection stages. As with all AR, one cycle never provides absolute answers to the research question asked. The findings drew insights into the research question 'What was our experience of smartphone microblogging for supporting mobile learning in post primary Religious Education?' This exploration of smartphone microblogging has been underpinned by Koole's (2009) device, learner and social aspects of mobile learning as identified in the FRAME model. The device aspect examined our experiences and perceptions of employing the smartphone and Edmodo for learning. The learner aspect investigated the cognitive learning of facts or 'learning about religion' and the deeper learning resulting from a reflective construction of personalised knowledge, thus implicating 'learning from religion' (Grimmitt 1987). The social aspect evaluated both Edmodo's online learning community and my pedagogical approach to assisting students' mobile learning. The potential benefits that smartphone microblogging could infuse in teaching and mobile learning within post primary Religious Education provided the rationale for this research, and its attendant findings and conclusions.

6.3. Conclusions

The conclusions drawn from this research resulted from reflection on my planning and on the actions and observations that permeated our experience in the practice smartphone microblogging. These conclusions concern insights derived from findings based on our experience of smartphone microblogging in supporting the device, learner and social aspects of mobile learning on 'Images of God'. Under these three aspects the following conclusions were reached.

Students experienced and perceived Edmodo as a useful, easy to use, convenient device for supporting mobile learning. It was perceived as a useful learning device that did not result in high levels of distraction from learning. In fact, a select number of students found their use of Edmodo for online learning, facilitated better engagement, in comparison to the standard offline learning in the Religious Education classroom. Findings indicated that a small number of students posts were off task. Edmodo was perceived as an easy to use device. This was verified by the small number of technical issues reported by students. Edmodo's portability and the students' preference for typing rather than writing homework was cited as a convenience for learning, and may have underpinned the positive perceptions. Although the research indicated that the majority of students used their smartphones regularly during the day, several students showed initial resistance towards using their smartphone for learning. It is important to note that Edmodo, like all technology is a potential valuable tool that 'does not necessary improve education' (Veenema and Gardner 1996, p.69). It is the user of the technology, in this case the teacher and student that dictates the benefit.

The learner aspect revealed that mobile learning on 'Images of God' was advanced through Edmodo's facilitation of textual and visual communication affordances, collaborative learning, seamless learning and reflection. Although some lurkers did not actively participate, evidence of high levels of communication and interaction emerged. The findings indicated that students enjoyed looking at, and regularly praised the visuals their peers drew or created. The majority of students perceived that their collaborative learning on Edmodo advanced their cognitive learning. Students scaffolded peers' learning through posing questions and offering opinions within online conversations on

'Images of God'. However, students' peer scaffolding was non-critical and non-confrontational as it mainly consisted of lower order questions, praise and agreement with peers' posts. This research demonstrated that Edmodo facilitated an inclusive learning place where students communicated their diverse images of God, including agnostic and atheist worldviews. A number of students recounted that their experience of Edmodo's open and transparent communication encouraged them to produce higher standards of work. This positive learning outcome was offset by some students engaging in digital plagiarism and using cyberslang and emojis within their posts. The support of seamless learning by Edmodo's online student-centred learning management system was perceived by students as a positive educational experience. Conversely, this aspect generated a negative experience for me, as teacher, as a constant flow of students' posts 24/7 often impinged on my personal time outside of school. The findings show evidence of Edmodo supporting different levels of reflection; empathic, systematic, self and transcendental. However, this was generally reduced to descriptions rather than critical reflection. A failure to ask higher order questions may have been a contributory factor. Notwithstanding the foregoing, nearly half of the students who actively participated on Edmodo reported that their personal image of God had changed. The overall findings showed that the students' employment of Edmodo facilitated both 'learning about religion' through its support of cognitive learning, and 'learning from religion' through its support of reflection. Related to this conclusion is the fact that both safe and disruptive learning were evident in the findings. The students' engagement with the different facets of mobile learning was supported by the social aspect of mobile learning.

The main themes that emerged from analysis of the social aspect of mobile learning concerned both my pedagogy and the virtual learning community. Dewey (1933) argues that 'We do not learn from experience. We learn from reflecting on experience' (p.78). As a reflective practitioner within this research, I engaged in critical reflection on teacher strategy. This involved navigation through the various PAR stages of this research. I followed a specific pedagogical plan namely Salmon's scaffolding model (2003), underpinned by connectivist and social constructivist learning theories. This pedagogical plan guided my teaching role in validating, praising, monitoring and questioning students' uploaded posts on 'Images of God'. The deployment of a connectivist and social

constructivist pedagogy within this research, presented a challenge as it destabilised my standard teaching role, as positioned within the locus of control. The findings revealed that the majority of my scaffolding of students' learning consisted of lower order questions. On the other hand, the findings indicate that the students' use of Edmodo enabled a virtual learning community that promoted interpersonal relationships and a sense of community within the five first year classes. The success of Edmodo's social aspect is evident from the incidence of online collaborative conversations promoting students' learning on 'Images of God'. This community offered a safe space for students to present, converse and critique their images of God. It was revealed that students' engaged in high levels of self-disclosure of their personal images of God, including agnostic and atheist worldviews Edmodo offered students an opportunity to connect with their spirituality. These finding demonstrate that the students' use of Edmodo achieved the redefinition level of the SAMR model (Puentedura 2013), namely that the use of technology created a new and innovative learning process that would not be feasible without technology. These conclusions underpin the following recommendations for a 'real-world teaching situation [which] aims to bring about change rather than just make observations' (Evans 2014, p.905).

6.4. Recommendations

These recommendations were developed from our experience of employing Edmodo for supporting mobile learning on 'Images of God' that incorporate tried and tested recommendations offered within the reviewed research in chapter two. I will present recommendations based as pedagogical strategies that will facilitate teacher and students' practice of smartphone microblogging for supporting the device, learner and social aspects of mobile learning within post primary Religious Education. The pedagogical strategies recommended for supporting the device aspect of mobile learning include:

- An audit of students' smartphone ownership and internet access at home and at school.
- Student training on using Edmodo along with guidance on safe and responsible online use.
- Promoting students' immediate self-reporting of technical problems via Edmodo.
- Encouraging students to address and resolve technical problems or general learning queries posted by peers.

- Continuous monitoring of students' posts ensuring technical problems or general learning queries are resolved promptly, effectively and efficiently.
- Turning off smartphone notifications when completing learning assignments.

The pedagogical strategies recommended for supporting the learner aspect of mobile learning include:

- Assessing or grading of posts as a required component embedded within a learning deliverable
- Minimising digital plagiarism by encouraging students to reflect, create and post their own original work online
- Regular monitoring of students' work online
- Providing frequent personalised feedback to individual students' posts
- Promoting students' online conversations and peer scaffolding to advance students understanding and learning
- Asking individual students lower and higher questions that encourages them to critically reflect on their own work

The pedagogical strategies recommended for supporting the social aspect of mobile learning include:

- Use of considerate and critical dialogic theories such as connectivism and social constructivism as opposed to didactic theories
- Reflective practice, such as self-observation and self-reflection, on how to improve the teacher's facilitation of smartphone microblogging
- Effective questioning of students learning and uploaded posts through lower and higher order questions

In outlining my recommendations, I am mindful of the limited parameters that underpinned this research. Firstly, the research involved a relatively small sample size from one specific year group, from one multi-denominational post primary school within one geographic and cultural context. Findings from this research cannot be generalised however some findings may be transferable to other contexts. Although AR is immersed within a specific context, transferability is possible. Nevertheless it is the reader not the

researcher who decides whether the research outcomes maybe transferred to their particular situation as Stringer (2014) notes:

It is possible for people not part of the study to make judgements about whether or not the situation is sufficiently similar to their own for the outcomes to be applied (p. 94).

Regarding transferability within this research, I would argue that several pedagogical strategies recommended such as an audit of students' smartphone ownership and internet access at home and at school and student training on using Edmodo along with guidance on safe and responsible online use could be transferred to other mobile learning situations. Secondly, I am conscious that employing a theoretical lens other than the FRAME model may have resulted in different nuances with regard to findings that emerged. Thirdly, as typical of AR research, I am aware that the findings do not offer a complete answer to the research question: 'What was our experience of smartphone microblogging for supporting mobile learning in post primary Religious Education?' In light of these limitation, I suggest that future research could investigate smartphone microblogging within post primary Religious Education involving students from inter-denominational, multi-denominational and faith-based post primary schools as well as research focused on supporting learning among SEN students. Notwithstanding the foregoing, I would claim that this research has contributed to new educational knowledge on the use of smartphone microblogging to support mobile learning within post primary Religious Education.

6.5. Contributions to new educational knowledge

The significance of this research stems from its potential contribution to new educational knowledge. The research offers offering an understanding and insight into the practice of smartphone microblogging supporting the device, learner and social aspects of mobile learning within post primary Religious Education. It can therefore influence future practice for both teachers and students, with specific reference to post primary Religious Education. This research can add to the growing body of research concerning mobile learning in general within Religious Education and smartphone microblogging in particular within post primary Religious Education. The research can also influence policy making in respect of mobile learning and smartphone use among students.

This research presents recommendations on pedagogical strategies for teachers in facilitating smartphone microblogging, focusing on the device, learner and social aspect of mobile learning. Although this research was positioned within the peculiar context of post primary Religious Education, I would argue that some of these recommendations could be considered and customised in smartphone microblogging apps or virtual learning environments other than Edmodo, within different age groups and across a wider range of subjects that would include diverse teaching and learning contexts. This research has contributed new knowledge to my own understanding of my teaching practice. As a reflective practitioner throughout this research process, I developed an informed voice through my involvement in the various AR stages. This has enabled a deeper understanding of my teaching role on facilitating students' employment of Edmodo. On a practical level I have learnt how to implement smartphone microblogging. I have also learnt that learning, especially reflection, needs robust and regular scaffolding that is planned, implemented, observed and reflected upon. Through discussions with educators and researchers at various conferences at which I presented, I now realise that supporting deeper critical reflection within smartphone microblogging, or any online or offline context is extremely challenging. It implicates several complex and diverse elements such as students' age, reflective skills and learning culture. I have learnt how to facilitate learning within an online virtual community. This has resulted in my having to adapt to a shift in pedagogical power from 'sage on the stage' to 'guide on the side' (Prensky 2008). I have also learnt to support students' cognitive learning about their 'images of God', to promote self-awareness of their personal images and to foster their appreciation of other students' diverse images of God and worldviews. I have reflected on this at a theoretical level. I have learnt that that Salmon's (2003) five-stage scaffolding model and Koole's (2009) FRAME model were effective pedagogical models for underpinning my teaching practice in facilitating smartphone microblogging. These models gave clear criteria and guidelines on how to plan, act and observe and reflect on my pedagogical practice in assisting student's use of Edmodo for supporting their cognitive learning and deeper learning on 'Images of God'. On reflection, I have progressed in achieving my vision as a religious educator leading students into 'a space of personhood' (Hederman 2012, p.10). In short, I have a deeper comprehension of my teaching practice and pedagogical vision through my involvement in this research. This correlates with one of the aims of AR, to

improve and understand our practice. This research has provided me with the opportunity to advance my understanding of my teaching practice resulting in self-understanding as O'Hanlon (2003) reiterates:

Self-understanding deepens when professional actions are articulated and defended with colleagues and research participants (p.99)

I will continue to research smartphone microblogging within my class by embarking on a third AR cycle of research which may offer a deeper understanding of smartphone microblogging supporting mobile learning within post primary Religious Education.

My students have learnt the skill of using smartphone microblogging for supporting their learning. They have also learnt about engaging in mobile learning beyond the conventional classroom. This research also offered them an opportunity to voice their experience and perceptions of smartphone microblogging as co-researchers. Furthermore, this research has encouraged, engaged and empowered students to embrace and debate their own viewpoint and appreciate the diversity and 'the uniqueness of each person' (Jackson 2004, p.88). This will facilitate the holistic development of students to become 'active thoughtful and empathic citizens in their future communities' (De Souza 2014, p.53).

This research makes original contributions to knowledge on research in mobile learning within Religious Education, specifically the practice of smartphone microblogging supporting mobile learning within post primary Religious Education. This research can contribute to the limited bank of research knowledge on mobile learning within Religious Education (Daily 2013). It can also contribute to the growing body of knowledge on online religion that has mainly focused on members who are already immersed within a particular religious community and culture (Boyle 2012; Campbell 2010; Lee 2009; Cheong et al. 2008; Campbell 2004). Furthermore, this research adds to the limited bank of research knowledge on technology within post primary Religious Education by specifically offering insights and recommendations on the practical employment of smartphone microblogging for supporting mobile learning. This research can also influence policy making regarding mobile learning and smartphone use among students at school level and national level. Within the Irish context, the '*Digital Strategy for*

Schools 2015-2020' (2015) identified that schools require advice and strategies on the effective integration of BYOD into their teaching and learning. The recommendations outlined in this research resulting from our experience of smartphone microblogging offers such advice, strategies and 'actionable knowledge' (Coghlan and Brannick 2014). Furthermore this research addresses many of the ICT element of Junior Cycle key skills such as employing 'technology and digital media tools to learn, communication, work and thinking collaboratively and creatively in a responsible and ethical manner' (2015, p.12). Current policy making on mobile learning is limited on a national level as well as an international level. The 2012 UNESCO '*Mobile Learning and Policies: Key Issues to consider*' report recognised a 'policy vacuum' on the integration of mobile devices within national and local educational institutions (Vosloo 2012, p.8). Within post primary Religious Education, there is currently no national statutory policy pertaining to mobile learning. I believe that the recommendations offered as well as the challenges encountered may act as a roadmap for guiding future policy making in this area.

In summary, this chapter presented a brief summary of this PAR research and outlined conclusions based on the findings. The implications of these conclusions for the future practice of smartphone microblogging for supporting mobile learning are offered as recommendations for future post primary Religious Education teachers to consider. This research has made an important and timely contribution to the growing field of mobile learning within Religious Education and specifically within post primary Religious Education.

'Yet religious educators/leaders today are stretched in many directions and thus may be more heavy invested in the expediency of mechanistic learning than the long complex process of mentoring people through inquiry and discovery. Technology is beginning to make individual learning broadly available in formal and informal contexts.'

(Daily 2013, p.126)

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Appendices

Appendix A: Key skills and their elements outlined in the Junior Cycle

Source: Framework for Junior Cycle, (DES 2015b), Figure 2, p.13.



Appendix B: Results from Scopus search using keywords smartphone microblogging Religious Education

Source: Scopus search dated 23rd of April 2016

The image is a screenshot of the Scopus search interface. At the top left, the Scopus logo is visible. The navigation bar includes 'Search', 'Alerts', 'Lists', and 'My Scopus'. On the right side, there are links for 'Scopus', 'SciVal', 'Register', 'Login', and 'Help'. A yellow warning banner at the top of the results area states 'No documents were found.' Below this, the search query is displayed: 'ALL (smartphone microblogging in religious education) AND RECENT (30)'. There are icons for 'Edit', 'Save', 'Set alert', 'Set feed', and 'View secondary documents'. At the bottom of the results area, it says 'Show results for: ALL ("smartphones" microblogging in religious education) AND RECENT (30) AND RECENT (30)'. A blue circle is drawn around the text 'Gap in literature' in the center of the page, with a blue arrow pointing from this circle to the search results area.

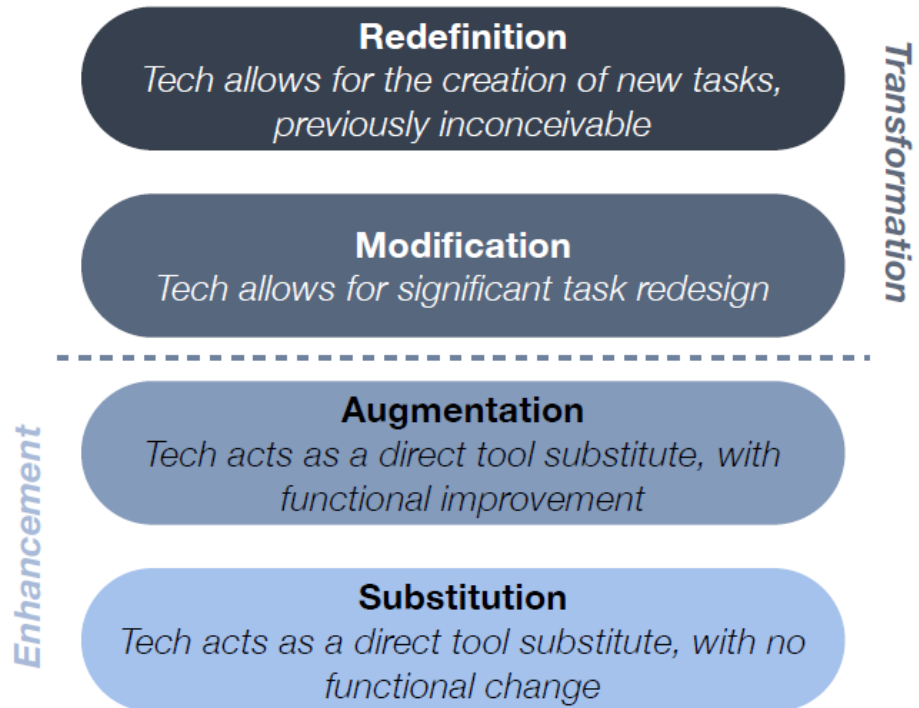
**Appendix C: Author, Date, Title, Research Question, Findings, Sample Number,
Country, Educational Institution from the reviewed research**

Date / Author	Journal	Title of Article	Research question	Sample Number/ Country/Educational Institution
2014/ Carpenter and Krutka	Journal of Research on Technology in Education	How and Why Educators Use Twitter: A Survey of the Field	How and Why Educators Use Twitter?	755 K–16 educators / 28 countries/ primary to university educators over four weeks
2014 / Evans	British Journal of Educational Technology	Twitter for teaching: Can social media be used to enhance the process of learning?	Can Twitter enhance the process of learning in Higher Education?	252 Undergraduate students / England/ University over 12 weeks
2014 /Krutka, et al.	Teaching and Teacher Education	Microblogging about teaching: Nurturing participatory cultures through collaborative online reflection with pre-service teachers	Can microblogging about teaching advance collaborative online reflective learning?	40 primary students / Singapore/Primary school
2014 / Mauroux, et al.	Vocations and Learning	Mobile and Online Learning Journal: Effects on Apprentices’ Reflection in Vocational Education and Training	Can mobile and online learning journal and a smartphone app for uploading digital photos support reflection on work experiences?	16 bakery and pastry cook apprentices/ Switzerland / Vocational Education and Training programme
2014 / Stephansen and Couldry	Information, Communicatio n & Society	Understanding micro-processes of community building and mutual learning on Twitter: a ‘small data’ approach	Can Twitter help construct a ‘community of practice’ that enabled micro-processes of recognition & mutual learning?	Teachers and students England/Secondary school sixth-form college

Date / Author	Journal	Title of Article	Research question	Sample Number/ Country/Educational Institution
2013 /Junco et al.	British Journal of Educational Technology	Putting twitter to the test: Assessing outcomes for student collaboration, engagement and success	What is the relationships surrounding student engagement and collaboration as they intersect learning outcomes?	179 undergraduates/ American Universities: Lock Haven, Pennsylvania State and South Dakota State University.
2012/ Hsu and Ching	The International Review of research in open/distance learning	Mobile Microblogging: Using Twitter and Mobile Devices in an Online Course to Promote Learning in Authentic Contexts	Are students engaged in designated coursework or social conversation when using mobile microblogging? Do students benefit from situated learning?	16 post-graduate students/ America/ University
2010/ Ebner et al.	Computers & Education	Microblogs in Higher Education – A chance to facilitate informal and process-oriented learning?	Can Microblogs facilitate informal and process-oriented learning in Higher Education?	34 undergraduate and two lectures Austria; University of Applied Sciences of Upper Austria.
2009/ Lee	Journal of Media and Religion	Cultivating the Self in Cyberspace: The Use of Personal Blogs among Buddhist Priests	Can Microblogs cultivate the self in cyberspace?	30 monks and nuns in Won Buddhism, Korea
2008/ Cheong, et al.	Journal of Media and Religion	The Chronicles of Me: Understanding Blogging as a Religious Practice	What is the nature of blogs, the motivations behind blog use for religious expression and the implications for religious community building?	200 blogs related to Christianity containing the key words include Bible, Christ, church, congregation, lord, pastor, pray, priest, salvation

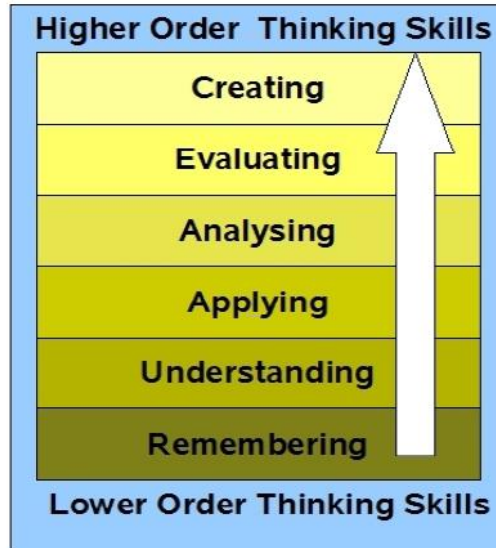
Appendix D: Substitution Augmentation Modification Redefinition Model (SAMR)

Source: SAMR: A contextualised introduction (Puentedura 2013, n.p.)



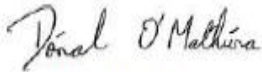


Appendix E: Bloom's Reviewed Taxonomy (Anderson, Krathwohl et al. 2001)

Source: Drawing by Andrew Churches (Churches 2008, p.4)



Appendix F: Ethics approval from DCU Research Ethics committee

<p>Ollscoil Chathair Bhaile Átha Cliath Dublin City University</p>	
<p>Ms Ciara Morrison-Reilly School of Education Studies</p>	
<p>12th September 2014</p>	
<p>REC Reference:</p>	<p>DCUREC/2014/154</p>
<p>Proposal Title:</p>	<p>Mobile Learning in Religious Education: Smartphones as reflective learning tools for engaging post primary students</p>
<p>Applicants:</p>	<p>Ms Ciara Morrison-Reilly, Dr Sabrina Fitzsimons, Dr PJ Sexton</p>
<p>Dear Ciara,</p>	
<p>Further to expedited review, the DCU Research Ethics Committee approves this research proposal. Materials used to recruit participants should note that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee. Should substantial modifications to the research protocol be required at a later stage, a further submission should be made to the REC.</p>	
<p>Yours sincerely,</p>	
	
<p>Dr. Donal O'Mathuna Chairperson DCU Research Ethics Committee</p>	
	<p>Taighde & Nuálaíocht Tacalocht Ollscoil Chathair Bhaile Átha Cliath, Baile Átha Cliath, Éire</p> <p>Research & Innovation Support Dublin City University, Dublin 9, Ireland</p> <p>T +353 1 700 8000 F +353 1 700 8002 E research@dcu.ie www.dcu.ie</p>

Appendix G: Letter of Plain Language Statement for parents and guardians

The title of this research is ‘Mobile learning in Religious Education: Smartphones as reflective learning tools for engaging post primary students’. The purpose of this research is to explore the use of smartphones or mobile phones with cameras and internet access, for reflective learning on the Junior Certificate Religious Education topic ‘Images of God’.

Participating students will be required to take part in nine classes within their timetabled Religious Education classes. The teacher, Ciara Morrison-Reilly, will present a smartphone workshop and the Junior Certificate Religious Education topic ‘Images of God’ within six of the nine classes. Students will then be asked to create a one minute video on their image of God and explain their image and what they learnt on an online discussion forum. This online discussion forum can be only accessed by the teacher and fellow research participants within their Religious Education class. Participating student will be asked to fill out a short online questionnaire on their experience of mobile learning. Participating student will also be asked to take part in a ten to fifteen minute interviews. These interviews will focus on questions exploring their mobile learning experience and will be audio recorded. The students’ interviews, videos, online discussions and observations of work will be used for research purposes with the students’ names and details remaining private subject to the established legal limitations on confidentiality. Every effort will be made to protect the students’ anonymity with no names of personas, places or groups mentioned appearing in the research findings. The data collected will be destroyed upon completion of this research. The researcher believes that there are no physical or psychological risks associated with this research. Findings of the research will be posted on the school website, with each research participant receiving a written summary of the results.

It is believed that the students will benefit from participating in this research by improving their technical ICT skills and teamwork skills, by advancing their knowledge around the Junior certificate module ‘Images of God’ and by developing their creativity and awareness of the human innate aspect of spirituality.

This principal investigator is Ciara Morrison-Reilly who is happy to answer any queries regarding this research through contacting the school for an appointment at 041 ***** or emailing her at ciara.morrisonreilly29@mail.dcu.ie

Appendix H: Consent form for parents and guardians

TITLE OF RESEARCH: Mobile Learning in Religious Education: Smartphones as reflective learning tools for engaging post primary students.

SCHOOL: Post primary school in North East

PRINCIPAL INVESTIGATOR: Ciara Morrison-Reilly.

STATEMENT OF THE PURPOSE OF THE RESEARCH: The purpose of this research is to investigate the employment of smartphones as reflective learning tools for exploring the Junior Certificate module 'Images of God'.

STATEMENT OF PARTICIPATION ACTIVITIES: This research project, involving nine class periods, will explore 'Images of God' from the Junior certificate curriculum followed by the creation of two short videos and online discussions using smartphone apps Edmodo and Animoto. Feedback on the form of a short online questionnaire, audio recorded interviews and focus group interviews on your child's experience of using the smartphone for learning as well as their videos, online discussions and classroom interaction will be used as anonymous research data.

Participant – please complete the following (Circle Yes or No for each question)

Have you read or had read to you the Plain Language Statement for Parents?

Yes/No

Do you understand the information provided?

Yes/No

Have you had an opportunity to ask questions and discuss this study if you wished?

Yes/No

If you did ask questions, did you receive satisfactory answers to all your questions?

Yes/No

Are you aware that if your child is selected to be interviewed that their interview will be audiotaped?

Yes/No

Are you aware that if selected your child's focus group will be audio recorded?

Yes/No

STATEMENT OF INFORMED CONSENT:

I have read the plain language statement and I have been fully aware of the implications of participation in the above named research.

I consent to(your child's name) taking part in the above named research.

Parents/Guardians signature: _____

Date:

Witness:

Appendix I: Consent and assent forms for student participants

Dear student,

I am requesting your participation in this research. Your participation will require you to create two short one minute videos and write about what you think online using your smartphone or a mobile device provided by the school. Videos and online forum discussions will centre on the Junior Certificate module 'Images of God'. This research project will require nine classes from your timetabled religion classes. You will be taught how to create a video using the smartphone app Animoto and communicate through a password secured online forum through the smartphone app Edmodo. This research project could benefit your learning on the topic 'Images of God' as well as improving your information technology communication (ICT) skills. You will be asked to fill in a short online questionnaire, take part in an interview or a focus group interview in order to share your experience of using the smartphone for learning. The results of the research will be published which may include your videos, online discussions, questionnaire answers and interviews. Your name will not be used and I will take all precautions to maintain your privacy and confidentiality. This research project will ensure safe and ethical use of smartphones for learning by following the guidelines from the Webwise programme and the code of behaviour as outline in your school journals. Your participation in this research is voluntary. If you choose to take part please note that you are free to withdraw at any point during the research. If you choose not to take part in the research, you will still complete the module 'Images of God' but will not take part in workshops on video creation, online discussions, questionnaires and interviews. Instead the teacher will provide you with other educational activities related to the topic.

Please take time to read and answer the questions below. If you have any concerns or questions in relation to the research please contact me after class or email at ciara.morrisonreilly29@mail.dcu.ie

Participant – please complete the following (Circle Yes or No for each question)

Have you read or had read to you the Plain Language Statement for Parents?

Yes/No

Do you understand the information provided?

Yes/No

Have you had an opportunity to ask questions and discuss this study if you wished?

Yes/No

If you did ask questions, did you receive satisfactory answers to all your questions?

Yes/No

Are you aware that if you are selected to be interviewed individually or within a focus group that your interview will be audio taped?

Yes/No

I have read and understood the information in this form and therefore, I will to take part in this research.

Signature: _____

Name in Block Capitals: _____

Date: _____

Thank you.

Ms. Morrison Reilly

Appendix J: Pre-research questionnaire

07/02/2016

Pre research questionnaire - Images of God

Pre research questionnaire - Images of God

The aim of this questionnaire is to gather information on using the smartphone in learning especially on 'Images of God'. This survey will ask ten questions and should take less than 5 minutes to complete.

Please click on the SUBMIT button once after the last question.

Please be assured that your response will remain confidential. Your co-operation is appreciated.

Thank you
Ms Morrison-Reilly

Name

Your answer

1. How did people picture God in the Old Testament?

Your answer

2. List one parable Jesus told to show what God is like

Your answer

3. What image of God did Jesus have?

Your answer

4. Name the THREE persons of the Trinity



Your answer

https://docs.google.com/a/mail.dcu.ie/forms/d/1fAYdyGmSR0pyR14heWJcs_hu14Xe9Wa7s_lbM6dqYKE/viewform

1/3

5. Have you thought about your image of God before?

If you do not have an image of God you do not have to answer

- yes
- no

6. Have you thought about how your image of God affects or influences your life and how you act?

If you do not have an image of God you do not have to answer

Your answer

7. What image of God or picture comes into your mind when you think about God?

If you do not have an image of God you do not have to answer

Your answer

8. List ONE experience that you had in your life that gave you a hint of what God is like

If you do not have an image of God you do not have to answer

Your answer

9. Who has helped shape your image of God

If you do not have an image of God you do not have to answer

- parents
- friends
- brothers and sisters
- teacher
- priest

10. List words that describe your image of God

If you do not have an image of God you do not have to answer

Your answer

SUBMIT

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Google Forms

Appendix K: Pre-research survey

23/04/2016 Pre-research survey

Pre-research survey

The aim of this survey is to gather information on using the smartphone in learning especially for learning in religion class and doing religion homework. This survey will ask questions about images of God.

This survey should take less than 10 minutes to complete. Please click on the SUBMIT button once after the last question. Please be assured that your response will remain confidential. Your co-operation is appreciated.

Thank you
Ms Morrison-Reilly

Section A: Personal details

1. Name

2. Class name

3. Are you

Female

Male

4. Do you own a smartphone?
A smartphone is a phone that allows you to surf the internet

Yes

No

4a. If you do not own a smartphone, can you use a parents/guardians smartphone with their permission

Yes

No

I have a smartphone already

5. Do you have internet connection at home?

Yes

No

https://docs.google.com/forms/d/1E1INPg5sj9DnznuOVV2rMaPgYkAM2B1q_pFf7lw-us/viewform 1/4

6. How often do you use your smartphone?

you can only tick ONE box

- Less than once a week but more than once a month
- Once a week
- Less than once a day but more than once a week
- Once a day
- Several times a day
- Continuously during the day

7. Do you use your smartphone for?

you can tick MORE THAN ONE box

- looking up information for school
- for social activities (online games, looking at Facebook, looking at Twitter, looking at Snapchat etc.)
- for making personal connections with friends (messaging friends directly using texts, Facebook, Twitter, Snapchat etc.)
- for making personal connections with people I do not know (messaging people you do not know through texts, Facebook, Twitter, Snapchat, etc.)
- for getting information for non school work

8. Have you had training or a workshop on how to use your smartphone for learning

- Yes
- No

9. Have you had training or a workshop on rules or guideline on using the internet safely and responsibly

- Yes
- No

Section B: Smartphone for learning

10. If you have a smartphone which of the following apps or platform do you use regularly (a lot of the time)

you can tick MORE THAN ONE box

- internet surfing or web browsing for information
- reading or sending texts
- reading news or entertainment
- watching videos
- playing mobile games
- reading or sending emails
- making phone calls

- taking photographs
- taking down notes for school
- using Facebook
- using Twitter
- using Snapchat
- using Instagram
- Other:

11. Have you ever used your smartphone for learning in religion class work or religion homework

- Yes
- No

12. If you have used your smartphone for religion class work or religion homework explain what you did

Do not answer if you have not used your smartphone for religion class work or homework

13. Do you like to experiment with new technology?

- Yes
- No

Section C: Images of God

14. Do you have an image of God?

image is a picture or what you think God look like

- Yes
- No

15. If you have an image of God describe or explain your image of God?

If you do not have an image of God it is OK to leave this question blank

16. If you do not believe in God describe or explain what you believe in?

17. Have you thought about, reflected or wondered about God this year ?

reflected means to think, wonder about or ponder

- Yes
- No

18. Is your image of God as

tick the boxes that you think describes or explains your image of God

- father
- mother
- in nature and animals
- Father, Son and Holy Spirit
- inside people
- you
- a judge, judging right and wrong
- a shepherd, minding his flock
- loving and forgiving
- as cruel punishing those who do wrong
- not existing
- everywhere and in everyone

19. If there is anything that you would like to ask or explain regarding smartphones or images of God please write here.

the survey is finished please press the SUBMIT BUTTON ONCE thank you

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Appendix L: Post-research questionnaire

23/04/2016

Post research questionnaire - Images of God

Post research questionnaire - Images of God

The aim of this questionnaire is to gather information on using the smartphone in learning especially for learning in religion class and doing religion homework. This questionnaire will ask ten questions about images of God.

This survey should take less than 5 minutes to complete. If you not want to answer a question you do not have to. Please click on the SUBMIT button once after the last question. Please be assured that your response will remain confidential. Your co-operation is appreciated.

Thank you
Ms Morrison-Reilly

Name

1. How did people picture God in the Old Testament?

2. List one parable Jesus told to show what God is like

3. What image of God did Jesus have?

4. Name the 3 persons of the Trinity

5. Have you thought about your image of God during this project

- Yes
 No

6. Does your image of God affect or influences your life and how you act?

If the answer is YES please explain how, if no please write NO

7. What image of God or picture comes into your mind when you think about God?

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1/2

If you do not have an image of God you can write what you believe in or leave this question blank

8. List 1 experience that you had in your life that gave you a hint of what God is like

If you have no experience you can leave this question blank

9. Has your image of God changed since you started doing this project?

Yes

No

10. Has looking at your classmates posts on their image of God helped you learning about different image of God ?

Yes

No

11. What surprised you about looking at your classmates posts on their images of God?

If you were not surprised, you can leave this question blank

12. List words that describe your image of God

If you do not have an image of God you can leave this question blank

Submit

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Appendix M: Post-research survey

30/06/2016 Post-research survey

Post-research survey

The aim of this survey is to gather information on using the smartphone in learning especially for learning in religion class and doing religion homework. This survey will ask questions about your image of God.
This survey should take less than 10 minutes to complete. Please click on the SUBMIT button once after the last question. Please be assured that your response will remain confidential. Your co-operation is appreciated.

Thank you
Ms Morrison-Reilly

Section A: Personal details

1. Name

2. Class name

3. Are you

Female
 Male

Section B: Smartphone for learning

4. What technology or device did you use during this project?
Technology or device means computer, laptop, smartphone, ipad, ipod

Computer
 Laptop
 Smartphone
 iPad
 iPod

5. Did you find Edmodo was easy to use?
Easy to use means that you had no problems working Edmodo

Yes
 No

6. Did you find Edmodo was useful or helpful for learning about 'Images of God'?

Yes

https://docs.google.com/forms/d/1IvJeC-_aZRlKjsL4QjsA9Q8Q-bBCC3jwDRh1mev_yzA/viewform 1/4

No

7. Would you use Edmodo again for learning?

Yes

No

8. Did you learn anything from looking at your classmates posts?

Yes

No

9. Did you enjoy looking at your classmates posts

yes

no

10. Did other students comments on Edmodo help you learn?

Yes

No

11. Did you learn anything suprising from your classmates using Edmodo?

Yes

No

12. If you did you learn anything suprising from your classmates using Edmodo what was it ?

13. Did you get to know your classmates better through using Edmodo?

Yes

No

14. Did the teachers comments help you learn and understand on Edmodo?
useful - did you learn or understand more

Yes

No

15. If I was using Edmodo again I would....



16. Would you recommend using Edmodo for learning in other subjects?

- Yes
 No

Section C: Images of God

17. Do you have an image of God?

image is a picture or what you think God look like

- Yes
 No

18. This is how I see my image of God now

Tick the boxes that you think describes or explains your image of God

- Father
 Mother
 In nature and animals
 Father, Son and Holy Spirit
 Inside people
 Inside you
 As a judge, judging right and wrong
 As a shepherd, minding his flock
 As loving and forgiving
 As cruel punishing those who do wrong
 Does not exist
 Everywhere and in everyone

19. Has your image of God changed since you started this project?

image is a picture or what you think God look like

- Yes
 No

20. If your image of God has changed since you started this project explain how it changed?

write one or two sentences about how you see God or a description of God, , if not just say it has not changed

30/06/2016

Post-research survey

21. If you do not believe in God describe or explain what you believe in or do not believe in write one or two sentences about what you believe in

22. Have you thought about, reflected or wondered about God since doing this project?
reflected means to think, wonder about or ponder

- Yes
 No

23. If there is anything that you would like to ask or explain regarding smartphones or images of God please write here.

The survey is finished please press the SUBMIT BUTTON ONCE thank you

Submit

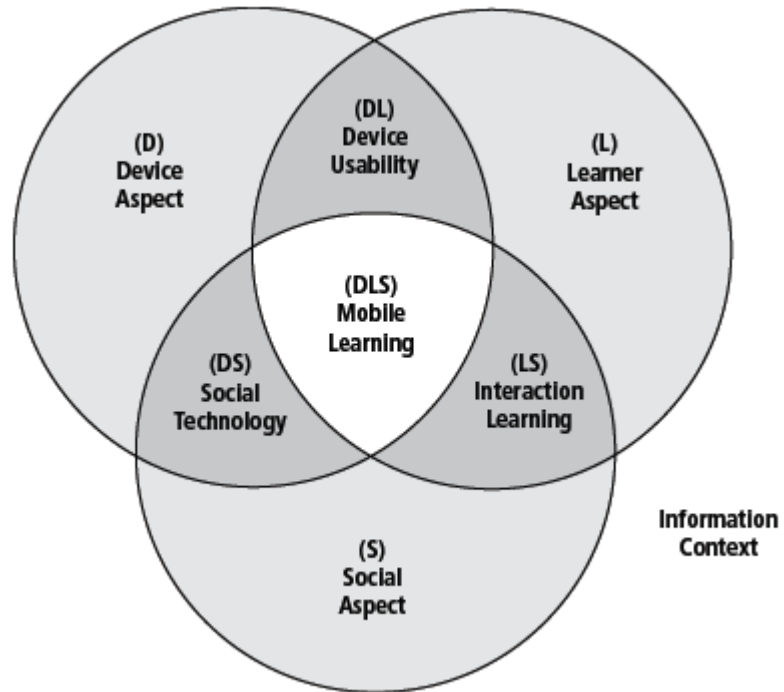
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Appendix N: The FRAME model (Koole 2009)

Source: Figure 1 in Mobile Learning (Koole 2009, p.27)



Appendix O: Focus Group questions

- What was your experience of using Edmodo?
 - How did you feel about using Edmodo on your smartphone?
 - Did you like using Edmodo on your smartphone?
 - If you did like using Edmodo on your smartphone what did you like about it?
 - Did you not like using Edmodo on your smartphone?
 - If you did not like using Edmodo on your smartphone what did you not like about it?
 - Did you experience any technical difficulties or problems with your use of Edmodo on your smartphone? If so what were they?
 - Where did you use Edmodo on your smartphone (at home, in school, enroute to / from school)?
 - Is there anything you would like to add about your experience of using Edmodo on your smartphone?
-
- What was your experience of learning about ‘Images of God’ through your use of Edmodo?
 - Did you learn about ‘Images of God’ through your use of Edmodo?
 - How did you feel about using Edmodo on your smartphone for learning about ‘Images of God’?
 - What did you like about using Edmodo on your smartphone for learning about ‘Images of God’?
 - What did you not like about using Edmodo on your smartphone for learning about ‘Images of God’?
 - Do you think that your learning about ‘Images of God’ was helped by your use of Edmodo?
 - Do you think that your learning was hindered or not helped by your use of Edmodo?
 - Is there anything you would like to add about your experience of using Edmodo on your smartphone?

- Would you use Edmodo again for learning, if so when and where?
- Would you recommend using Edmodo for learning to the first year students starting off next year?
- Is there anything you would like to add about your experience of using Edmodo on your smartphone for supporting your learning?
- What was your experience of using Edmodo to connect with your classmates?
- How did you feel about using Edmodo to connect with your classmates?
- What was your experience of using Edmodo to connect with your teacher?
- How did you feel about using Edmodo to connect with your teacher?
- What do you think the role of the teacher was on Edmodo?
- Is there anything you would like to add about your experience of using Edmodo on your smartphone for supporting your learning?