HIBERNIA COLLEGE

EST.MM

Education Papers

Volume 5

@hiberniacollege

hiberniacollege.com

Doggett Print
Building 3
Greenmount Industrial Estate
Harold's Cross
Dublin 3
The Doggett Group www.doggettprinters.com

First published 2023

ISBN: 978-1-9997543-6-5

Contents

Foreword

The School of Education is delighted to publish Volume Five of the Hibernia College Education Papers. On our Professional Master of Education programmes, students complete a 10,000-word dissertation as part of their Research module. The Research module emphasises lifelong learning through reflection. With the support of the Research team, students are encouraged to work independently and to demonstrate an ability to plan, implement and evaluate an empirical investigation that integrates theories, knowledge and skills central to the curriculum and is informed by their school placement practice. Student teachers, as researchers, choose a topic from four different pillars: (1) Teaching, Learning and Assessment (TLA); (2) Digital Literacy and Learning Technologies; (3) Inclusive Education; (4) Global Citizenship, Sustainability and Wellbeing.

We pay tribute to the resilience of our primary and post-primary graduate teachers who demonstrated steadfast versatility as student teachers during one of the most fluctuant and unprecedented periods across the education sector in 2020 and 2021 as a result of the COVID-19 pandemic. This uncertain landscape introduced new challenges that the College, as a whole, addressed in renegotiating our identities as teacher educators and embracing alternative forms of research. In this volume, the research project took the form of documentary research with a focus on an integrative literature review methodology.

Now in its fifth year, we celebrate our graduate teachers' broad and diverse range of research interests in the dissertation topics presented — comprising inquiry-based learning; formative assessment practices and feedback; self-determination strategies in Mathematics; wellbeing in SPHE and PE; inclusive education; outdoor learning; linguistic codes; numeracy; UDL principles; ICT integration; and EAL in the mainstream classroom.

We applaud the commitment and care demonstrated by our research supervisors in supporting our student teachers throughout the research process. The impact of the past two years on initial teacher education and research has been significant. However, this volume is testimony to the exceptional work that these graduates reflect on the need to continue to preserve and disseminate educational research that is pivotal to Irish education today.

Dr Mary Kelly
Academic Dean

Dr Linda Butler Neff
Lecturer in Education (Research)

Formative Assessments Practices in Inquiry-Based Science Education

Mary Corless

Biography

Mary Corless graduated with a Bachelor of Science (Hons) in Biotechnology from University of Galway and worked in the clinical diagnostics sector for more than ten years. Mary is very much driven by her desire to deepen her knowledge of inquiry-based learning (IBL), especially in relation to Science, so as to make sense of contemporary issues such as genetic engineering, global climate change, new cancer treatments and alternative energy sources. Having graduated with a First-Class Honours in the Professional Master of Education (PME) from Hibernia College in 2022, Mary is currently teaching Science and Biology at Junior Cycle and Senior Cycle levels and continues to engage her students through IBL approaches and assessments.

Formative Assessments Practices in Inquiry-Based Science Education

Research Supervisor: Dr Ray Walsh

Abstract

This integrative literature review aimed to elucidate how formative assessment practices can be effectively implemented in *inquiry-based* science education and identify the challenges associated with implementing those practices. The role of digital technology as a flexible and dynamic formative assessment tool was common throughout the selected papers, which allowed descriptive and meaningful feedback to be delivered. Secondly, teachers' questioning style was shown to either stifle or facilitate inquiry and highlighted the significant role of professional development in implementing inquiry successfully. Lastly, the role of rubrics as a lens for conducting self-assessment and peer assessment was also evident. The studies show a consensus with the wider literature on formative assessment practices such as feedback, questioning, use of rubrics, self-assessment and peer assessment, with the potential of digital technology to enhance formative assessment being identified as a significant area for further research.

Keywords: Formative assessment, inquiry-based learning, digital technology

Introduction and Background

The concept of inquiry-based pedagogy is by no means new. At the turn of the twentieth century, educational reformer John Dewey (1902) articulated that experiential learning directly related to that of learner needs to engage directly with their environment. Inquiry is the essence of scientific thinking and practice, which can lead to the skills and attitudes essential for 21st-century learners as active participants in increasingly technology-based societies (Barron and Darling-Hammond, 2008). The widespread implementation of inquiry-based learning (IBL) is scarce and faces several challenges despite significant recommendations (Rocard et al., 2007). Teaching inquiry is challenging for teachers because internal factors such as teachers' content knowledge, pedagogical content knowledge and their beliefs about inquiry all inform and influence teachers' adoption of inquiry pedagogy (Wallace and Kang, 2004). External factors that may include time constraints, curriculum and accountability pressures also influence teachers' adoption of IBL. Moreover, issues over *assessment* of inquiry remain a major challenge in implementing IBL.

While conceptual knowledge may be assessed quite effectively through conventional tests, assessment of inquiry requires a more sociocultural-oriented assessment format (Dolin and Krogh, 2010). A report by the Organisation for Economic Co-operation and Development (OECD) (2013) states that classroom assessment in many countries is still dominated by summative assessment with little regard for assessment of inquiry skills (Looney, 2011). There is a need for an assessment framework to support teachers to assess IBL in their classrooms if such an approach is to be developed and sustained in classrooms. Harlen (2013) notes how different stages in inquiry could be used as

opportunities to gather evidence of learning — a key practice in formative assessment, which is an approach that uses classroom assessment to broaden learning. Whilst there is substantial research detailing what exactly formative assessment (FA) encompasses, there are four most common interrelated elements that consist of: clarifying, understanding and sharing learning intentions and success criteria; engineering effective classroom discussions, tasks and activities that elicit evidence of learning; informative, descriptive feedback that promotes learning; and lastly, student self-assessment and peer assessment.

Strategies and Assessment

While research suggests the teachers gain richer assessment evidence when students engage with IBL, challenges exist when enacting FA in real time. Such challenges relate to the difficulty of collecting data from every student, the effect of pairwork on individuals' performance and the reliability of the teacher's assessment judgements (Harrison, 2014). Strategies for Assessment of Inquiry Learning in Science (SAILS), an EU-funded pilot project seeking to create a working assessment system for inquiry, exemplifies how assessment practices are embedded in inquiry lessons. Various FA practices are suggested, such as rubrics, to evaluate planning investigations and scientific reasoning. Other recommended FA strategies include providing feedback through discussion with peers, individual assessment of students based on documentation of the experiment, teacher questioning and feedback to students, and student self-assessments. Computer-based assessment is further considered a promising way to promote FA practices in schools as it can 'individualize feedback, increase student engagement, and support self-regulated learning' (Russell, 2010, cited in Van der Kleij and Adie, 2018, p.612). Inquiry learning is strongly advocated by the National Council for Curriculum and Assessment (NCCA) whose main aim of the Junior Cycle Science specification encourages students to develop a scientific mindset of inquiry orientation through classroom activities (NCCA, 2015). The unifying strand, the Nature of Science (NoS), permeates all the strands of the specification with its strong focus on inquiry. The 2015 Framework articulated some fundamental changes to teaching, learning and assessment, with school-based assessment deemed an important part of the reform. This reflects an intentional move away from assessment as solely based on summative judgements towards assessment as supporting learning (Department of Education and Skills (DES), 2015). Students now undertake two formal FAs during their Junior Cycle Science in the form of class-based assessments (CBAs). The Extended Experimental Investigation (CBA 1) has a strong focus on inquiry in giving students an opportunity to research a question about science-related phenomena. In theory, the student-centred nature of FA practices lends itself well to the sociocultural nature of IBL. FA is widely recognised as a critical driver of student learning when implemented effectively and has become a 'policy pillar of educational significance' (Van der Kleij et al., 2018, p.620). However, despite an abundance of research in both IBL and FA, research shows that many teachers are still unsure as to how to formatively assess inquiry activities effectively in their classrooms, which has led to the following research questions:

1. How can FA practices be implemented effectively in inquiry-based science teaching?
2. What challenges exist for teachers when implementing different modes of FA during inquiry-based learning activities?

Methodology

Literature Reviews

A literature review is a specific type of documentary research that summarises past empirical or theoretical literature to provide a more comprehensive understanding of a particular problem (Broome, 1993). Often referred to as desk research, literature reviews help identify what has been written on a topic, determine the extent to which a specific research area reveals any interpretable trends, and help identify topics requiring more investigation (Paré et al., 2015). There are several ways to classify types of reviews (Grant and Booth, 2009; Moher, Stewart and Shekelle, 2015), but they can be broadly categorised into two types: narrative and systematic. Narrative or traditional reviews typically set out to bring about a deeper understanding of broad, complex problems. They aim to provide clarification and critique through interpretative synthesising, using creativity and expert judgement. They tend to rely on a broad range of sources culminating in a reasoned, authoritative argument based on informed judgement. However, traditional reviews often lack thoroughness and are not undertaken systematically (Tranfield et al., 2003).

Systematic reviews gather and analyse evidence about a specific, clearly formulated question according to a predetermined, structured and detailed method. The term integrative literature review (ILR) is sometimes used interchangeably with systematic review; however, there are some key differences between them. Whilst an ILR uses a systematic process to identify, analyse and appraise all selected documents, it does not include statistical synthesis models. A systematic review has a single, narrowly focussed question whereas an ILR provides a critical analysis of empirical, methodological or theoretical literature that draws attention to future research needs (Toronto and Remington, 2020). Through the process of systematically analysing and summarising the research literature, a well-prepared ILR may provide a more complete picture of the research landscape within a specific topic area and act as a standalone research methodology (Russell, 2005). I chose an ILR to address the specific research questions regarding the use of formative assessment in the context of inquiry-based science education because this represented a relatively new topic that would benefit from a holistic conceptualisation and synthesis of the literature to date.

Integrative Literature Review

This dissertation utilised an integrative literature review (ILR) to explore and synthesise the literature on how FA practices can be effectively employed during inquiry-based science lessons. While there are several ways of conducting a literature review, an ILR was chosen for this review as it enables the evaluation of the current state of knowledge and identifies gaps in current research (Russell, 2005). It also identifies future research needs and allows for the bridging between two different, but related, areas of practice: FA and IBL. An ILR allows for the inclusion of diverse methodologies to understand a particular defined focus more clearly (Whittemore and Knafl, 2005). It is also envisioned that engagement with the literature and research in this area will have a positive impact on the teacher's ability to implement FA practices effectively during inquiry science lessons in the future.

An interpretivist paradigm is a naturalist approach that aims to understand the subjective world of human experience (Guba and Lincoln, 1989). Applied to educational

research, this paradigm enables researchers to build rich local understandings of the life-world experiences of teachers and students and of the cultures of classrooms, schools and the communities they serve. As an ILR, and in the context of the research questions, this dissertation used data to focus on the *effectiveness* of FA strategies in inquiry learning that involves a quantitative approach, and then examined the challenges associated with it involved in a context-specific, qualitative approach. However, it is fundamentally interpretivist in nature, as its major goal is to synthesise new information from findings in the literature.

The process of conducting an integrative literature review should be approached with the same intensity and scientific rigor used when conducting primary research. Integrating evidence from qualitative and quantitative studies is challenging, and methodological approaches to such syntheses vary (Hong et al., 2017). Cooper (1998) conceptualises the integrative review as occurring in five stages, which have been adopted for this dissertation. The first stage prepares and provides context for the guiding question(s) under investigation, ensuring that the research question and purpose are clearly defined. This is followed by a literature search, which incorporates a comprehensive search strategy. Data evaluation then focuses on the authenticity, methodological quality, informational value and representativeness of the available primary studies. In the fourth step, data analysis, the reviewer reorganises and integrates concepts across a body of literature. Finally, in the last step, the researcher synthesises new knowledge about their chosen topic, comprehensively portraying the integration process and describing the implications for practice, policy and research, as well as the limitations of the review (Torraco, 2016). The following section details how this approach was applied to this dissertation.

1. Problem formulation

The integrative review process began by choosing an area of interest that necessitated research based on professional knowledge, personal interests and experience. Formative assessment (FA) and inquiry-based learning (IBL) are two aspects of teaching and learning that have potential to improve student learning. During the scoping process, which involved exploratory reading, it became apparent that reviews on FA practices and IBL in science are plentiful and offer valuable insight into the usefulness of both FA and IBL in improving student learning (Black and Wiliam, 1998; Bennett, 2011). However, there was an apparent deficiency in literature reviews regarding the use of FA *during* inquiry-based science education; hence, this guided the direction of the research. Critical engagement with a supervisor led to the devising of the specific research questions.

2. Data collection/literature search

Data collection began by systematically searching four online databases — Academic Source Complete, Education Source, ERIC (all three were part of EBSCOhost), and Taylor and Francis — using specified keywords and specific search strategies. The search terms deemed most relevant in the context of the background reading and the research questions were formative assessment/Assessment for Learning, inquiry learning/inquiry-based learning and science education. The search terms were applied using Boolean logic with the following:

- In abstract: (Formative assessment OR Assessment for Learning) AND scien* inquiry OR inquiry skills OR science practices

The initial screening requirements also required that the articles must:

- Be published in peer-reviewed journals
- Be published between 2011 and 2021
- Be empirical studies (both quantitative and qualitative)

A total of 110 documents were retrieved, with 41 from ERIC, 39 from Education Source, 10 from Academic Source Complete and 20 from Taylor and Francis.

3. Data evaluation

Duplicates were removed, and the titles and abstracts of the remaining articles were scrutinised using the following evaluation criteria:

- Relevant to secondary school science teaching
- Relevant to the research question(s)
- Appropriate methodology
- Sufficient sample size and sampling method
- Recognition of the limitations
- Be written in English

Sixty-five abstracts were read, followed by twenty-three full articles. Eleven articles were further excluded following more comprehensive evaluation, to leave twelve articles in the final selection. Table 1 illustrates the screening process.

Table 1: Screening process for selected papers

Database/Source	Records screened	Abstracts read	Articles read/ evaluated	Included
Education Source	39	23	11	5
Academic Search Complete	10	5	2	1
ERIC	41	28	7	4
Taylor and Francis	20	9	3	2
Total	110	65	23	12

4. Data Analysis

In this step, each body of literature was deconstructed into its most basic elements. A review matrix was utilised to aid data analysis, ensuring the data abstracted from each source was closely aligned with the research question (Garrard, 2017). A separate review matrix was used for each research question. Searching across the review matrix, the data was categorised and coded to identify patterns using Braun and Clarke's (2006) recurring six phase framework to guide the analysis. Step one was to become familiar with the data by reading and re-reading the articles. Step two was to generate initial codes, which were then examined (step three), reviewed (step four) and defined to

identify the essence of what each theme is about (step five). Finally, the themes were written up (step six).

5. Interpretation of results

Dissemination of the findings began by summarising the selected articles, authors, purpose, method approach and findings in a table. Limitations and challenges associated with certain articles were documented, along with actions taken to mitigate against these limitations. Implications for policy, practice and research were synthesised and are discussed in the findings and discussion.

Table 2: Summary of selected papers

	Author	Purpose	Sample	Methodology	Findings/Summary
1	Arnold, Kremer, Boone and Mayer (2018).	Evaluation of a test instrument to measure students' scientific inquiry competence (SIC).	220 students aged 15-19, before and after a biology inquiry unit.	Mixed methodology using written text focussing on 3 sub competences of SIC- generating hypotheses, designing experiments and analysing data.	The instrument was successful in measuring SIC and evaluation of student learning. The observed pattern in competence difficulty matches the pattern predicted from theory.
2	Atar (2011).	To investigate the factors that facilitate or impede the integration of inquiry into school science.	14 middle school science teachers.	Qualitative methodology involving online correspondence and semi-structured interviews.	The factors that impede the integration of inquiry into middle school science include teachers' lack of CK and inquiry experience, over- emphasis on standardised tests, lack of teacher collaboration and lack of student readiness.
3	Ateh (2015)	To investigate teachers' elicitation practices and their impact on FA	2 secondary school science teachers in Northern California (as part of a larger study involving 10 high schools	Qualitative methodology involving video recording of classes and interviews with teachers.	The elicited evidence of learning that was used in making instructional decisions, was not representative of students' conceptual understanding. There was a mismatch between the teachers' perspectives of the FA practice and what is considered effective FA.
4	Chu and Leighton (2019)	To investigate two enhancements of DLSA assessments: pre-learning activity (PLA) Learning Error Intervention (LEI)	298 Grade 9 students from 14 different classes with 10 teachers.	Mixed methodology using quantitative data from digital laboratory activities and qualitative survey assessments.	The findings show that both a PLA and LEI may be beneficial in improving students' performance on a DSLA.
5	Correia and Harrison (2020)	To investigate teachers' beliefs about inquiry and how this impacts teacher practices	4 secondary school science teachers (as part of a EU-funded ASSISTME study in the UK	Qualitative case study over 14 months involving written reflections, lesson plans audio recordings and field notes.	The study showed how teachers who position themselves as facilitators adopt more open guided inquiry approaches and those who position themselves as 'shepherds' adopt more directed approaches to inquiry.
6	Davenport, Rafferty and Yaron (2018)	To investigate how a virtual chemistry lab supports learning and whether the use of context influences students' learning.	1473 students and 13 teachers in 12 high schools in San Francisco, USA.	Mixed methods using data from assessments (pre and post-tests), computer log files, teacher logs and interviews.	The findings show there was increased learning in problem-solving and inquiry over the course of the activities and that students learn more effectively when the activities are used after initial exposure to the content and when they work individually rather than pairs.
7	Donnelly, McGarr and O'Reilly (2014)	To explore how classroom discourse can either stifle or facilitate inquiry-based approaches in science lessons	Two secondary school chemistry teachers in Ireland	Qualitative case study involving video observations, pre/post teacher interviews and student focus groups.	The findings indicate predominant teacher monitoring on task completion over task understanding and that well-established power relations are a limiting factor in the capacity of teachers' IBSE implementation.
8	Grob, Holmeier and Labudde (2017)	To explore the challenges faced with implementing FA practices and analysis of the support measures suggested by teachers in the study.	11 science teachers in a Swiss secondary school over 3 semesters.	Qualitative approach using written reporting tools and interviews	Challenges related to organisational and pedagogical issues such as planning, correct time to provide feedback as well as challenges related to the content and structure of the feedback and effort needed. Support measures such as rubrics, examples of good practice, time and assessment literacy support.

9	Matuk and Linn (2017)	To explore how technology can support peer idea exchange during inquiry learning during a biology unit.	297 grade 7 students from 10 different classes with 2 science teachers.	Mixed methods using qualitative data from Idea Manager, a tool for collection and exchange of ideas during science inquiry projects and quantitative data from pre and post project tests.	The findings show that the tool (Idea Manager) promoted students' eliciting of ideas and found a relationship between the diversity of students' ideas, the source of those ideas and the quality of students' scientific explanations.
10	Psycharis (2015)	Explore the effects of formative assessment strategies and scientific abilities rubrics on student engagement in inquiry-based teaching and learning.	80 prospective science teachers from a 3rd year Science Education course	Mixed methodology using rubrics specifying particular features on Inquiry based teaching and learning.	Students with a high score in the use of inquiry features also had a high score in scientific abilities and that the rubrics can guide students in self-assessment.
11	Qablan (2012)	To determine if teachers' participation in PD resulted improved their ability to design and implement inquiry-based lessons.	4 secondary school science teachers in Jordan.	Qualitative design utilising lesson plans and 4 classroom observations throughout the PD program.	Teachers benefited from PD and were better able to design and implement inquiry-oriented lessons. However, they scored low in two particular aspects of inquiry - asking scientifically oriented questions and designing and conducting experiments.
12	Taibu, Mataka and Shekoyan (2021)	To investigate how the use of Phet simulation in an inquiry fashion improves students' scientific skills and attitudes to physics	61 physics students (2 classes) at a community college in North-eastern USA.	Mixed methods design - quantitative data involving a Likert-scale questionnaire and qualitative data via a reflection survey	The instructional approach that involved the use of Phet simulations facilitated students in acquiring the necessary scientific skills and students developed positive attitudes to physics

Findings and Discussion

All the selected papers were published from 2011 to 2021, with a wide geographical distribution (five were from the US, two from Switzerland and one each from Ireland, UK, Canada, Turkey and Jordan). Six of the papers were qualitative studies and six were mixed methods studies. The studies involved various modes of eliciting evidence of student learning from inquiry-based lessons or projects with a diagnostic view to enhance students' learning. The sources of quantitative data in the mixed methods studies were written or e-assessments, computer log files from online digital activities, and assessment rubrics. Qualitative data was sourced from semi-structured interviews, classroom observations and online correspondence. The studies employed different timescales for their work, varying from two class periods to semester-long projects. Sample sizes in the studies varied depending on the type of research being conducted. Studies involving teacher questioning and PD were small (two to four teacher participants). Challenges in implementing FA comprised a sample from eleven to fourteen teacher participants. Studies involving the use of rubrics and technology were much larger, varying from 61 to 298 students. One very large study using digital technology involved 1,473 students covering twelve schools. Analysis of the literature reveals several strategies teachers use to formatively assess students' work during inquiry, which are collated under three specific themes:

1. Digital technology as a FA tool during inquiry
2. Teachers' use of questioning and effective classroom discourse during inquiry learning
3. The use of rubrics (for feedback and self-assessment) and peer learning in inquiry learning

Challenges and opportunities associated with implementing each of the approaches are also discussed arising from the analysis of the selected papers.

Digital technology as a formative assessment tool

Half of the studies utilised digital technology as dynamic and flexible assessment tools. Data from virtual labs can be used as 'evidence' of student learning during inquiry and used to provide personalised feedback (Matuk and Linn, 2018; Chu and Leighton, 2019). Subsequently, the student can put this feedback into action and actively improve their inquiry skills (Davenport et al., 2018; Taibu, 2021). This circumvents real lab challenges reported in the wider literature such as the impossibility of gathering evidence from all learners and issues of time and costs, which hinder students repeating experiments (Harrison, 2014). One noteworthy study showed students fared better working independently than students working in pairs (Davenport, 2018). The authors noted that most studies that showed large benefits for pair-based learning were based on lecture-based instruction, and the benefits of pair-based learning may differ for online interactive activities.

Whilst computer-based assessments such as Kahoot! and Quizizz have become extremely popular in recent years, they focus on knowledge and facts and are not designed for assessing performance competences such as inquiry. The selected studies highlight how virtual labs can be an effective tool in furnishing the teacher with *evidence* of student learning, which the teacher can use to progress learning. Teachers used rubrics to provide feedback in most cases, which were compiled by the authors in most cases (Matuk and Linn, 2018; Arnold, 2018). Whilst there is no doubt that the formulation of rubrics takes time and knowledge of the subject (Atar, 2011; Grob, 2017), fully integrated rubrics allow for opportunities wherein the students can receive descriptive, meaningful and personalised feedback, which maximises the learning taking place and which, in turn, addresses the methodological challenges of providing feedback in the context of IBL in the classroom.

Teachers' use of questioning and effective classroom discourse during inquiry learning

Findings show that the second FA practice focussed on the importance of the teacher's questioning style in inquiry learning. The studies demonstrate that teachers favoured lower-ordered, closed questioning and did not give sufficient wait time for the students to respond (Donnelly et al., 2014; Correia and Harrison, 2020). In some cases (Ateh, 2015), the teachers answered the question themselves, hindering any chance of substantive classroom discourse. Indeed, Donnelly (2014) showed that convergent questioning can stifle inquiry. The typical didactic contract is reversed in inquiry classrooms, with students encouraged to take ownership over their learning by posing questions, critiquing and debating findings; however, many students struggle with this change in power relations. A major challenge to teachers is to decipher the level of guidance provided during inquiry; too much interference may be too directive and inhibit creativity. The importance of fostering a culture of formative assessment that enhances inquiry learning is highlighted by several authors (Grob, Holmeier and Labudde, 2017; Matuk and Linn, 2018; Chu and Leighton, 2019). PD to help teachers conduct more authentic inquiry may be required. Indeed, teachers who used more divergent questioning had recently undergone PD in IBL (Correia and Harrison, 2020). It is widely accepted that teaching through inquiry is a challenge for teachers (Flick and Lederman, 2004). Insufficient disciplinary knowledge, inadequate assessment literacy, along with

personal beliefs are reported as major influences, and the role of teachers' continuous PD to keep attuned with pedagogical developments is of great importance.

The use of rubrics (for feedback and self-assessment) and peer learning in inquiry learning

Thirdly, results show that rubrics could also be used to guide self-assessment and peer assessment during inquiry learning. In this case, students participated in self-assessment, directed by rubrics (Psycharis, 2016; Taibu, 2021). The authors state that rubrics were also used as a way of making the learning intentions clear, and students were clear on the purpose of the activity in line with best practice for FA (Wiliam, 2014). Taibu (2021) showed how students used these rubrics to give peer feedback at set points during a semester-long project (long-cycle FA), and students could effectively implement changes before their final submission date. Time taken to prepare and formulate rubrics, plan strategic questions and develop content knowledge required to implement the strategies are major challenges to conducting formative assessment during inquiry lessons. Moreover, the potential for digital technology to enhance learning was illustrated with Matuk and Linn (2018) utilising software to allow students to share ideas during inquiry tasks. However, Grob's (2017) findings echo the wider literature with regard to the challenges of peer assessment. Teachers are not confident about the *quality* of peer feedback, and there are risks of misconceptions being introduced along with difficulties with procedural issues such as timing (Brown and Harris, 2013).

Conclusion

Whilst the benefits of inquiry-based learning are widely accepted, suitable methods to *assess* students' inquiry skills are not well established (Harlen, 2015). With the new Junior Cycle in its relative infancy, there is clear direction for future research regarding the effectiveness of formative assessment practices in the context of inquiry science learning. The literature here highlights the potential use of digital technology as a formative assessment tool without taking much time from teaching and learning to spend on generating, evaluating and interpreting assessments. The Teaching Council's *Digital strategy for schools* (2020) aims to have a 'comprehensive range of classroom practice exemplars, underpinned by constructivist pedagogical principles, to guide the embedding of digital technologies in teaching, learning and assessment'. Black and Wiliam (1998) point out, however, that research-based evidence on formative assessment is unlikely to induce change as teachers need a variety of living examples of implementation. Further research may help support teachers embrace the amalgam of formative assessment in the context of inquiry learning.

References

Atar, H. (2011) 'Investigating the factors that impede or facilitate the integration of inquiry into middle school science', *Asia-Pacific Education Researcher (De La Salle University Manila)*, 20(3), pp.543–558.

Ateh, C. (2015) 'Science teachers' elicitation practices: insights for formative assessment', *Educational Assessment*, 20(2), pp.112–131.

Barron, B. and Darling-Hammond, L. (2008) 'How can we teach for meaningful learning?', *Powerful Learning: What We Know about Teaching for Understanding*, 1(2), pp.11–70.

Bennett, R.E. (2011) 'Formative assessment: a critical review', *Assessment in Education: Principles, Policy and Practice,* 18(1), pp.5–25.

Black, P.J. and Wiliam, D. (1998) 'Assessment and classroom learning', *Assessment in Education: Principles, Policy and Practice*, 5(1), pp.7–73.

Bloom, B.S., Hastings, J.T. and Madaus, G.F. (1971) *Handbook on formative and summative evaluation of student learning*. New York: McGraw-Hill.

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp.77–101.

Broome, M. (1993) 'Integrative literature reviews for the development of concepts', in Rodgers, B.L. and Knafl K.A. (eds.) *Concept development in nursing*. Philadelphia, PA: W.B. Saunders Company.

Brown, G.T. and Harris, L.R. (2013) 'Student self-assessment', in McMillan, J. (ed.) *Sage handbook of research on classroom assessment*. Los Angeles, CA: Sage, pp.367–393.

Chu, M. and Leighton, J. (2019) 'Enhancing digital simulated laboratory assessments: a test of pre-laboratory activities with the learning error and formative feedback model', *Journal of Science Education and Technology*, 28(3), pp.251–264.

Cooper, H. (1998) *Synthesizing research: a guide for literature reviews*. 3rd edn. Thousand Oaks, CA: Sage.

Correia, C. and Harrison, C. (2020) 'Teachers' beliefs about inquiry-based learning and its impact on formative assessment practice', *Research in Science & Technological Education*, 38(3), pp.355–376.

Davenport, J.L., Rafferty, A.N. and Yaron, D.J. (2018) 'Whether and how authentic contexts using a virtual chemistry lab support learning', *Journal of Chemical Education,* 95(8), pp.1250–1259.

Department of Education and Skills (DES) (2015) *Framework for Junior Cycle*. [Online] Available at:https://www.education.ie/en/Publications/Policy-Reports/Framework-for-Junior-Cycle-2015.pdf (Accessed: 23 January 2022).

Dewey, J. (1902) *The child and the curriculum*. Chicago: University of Chicago Press.

Dolin, J. and Krogh, L. (2010) 'The relevance and consequences of Pisa science in a Danish context', *International Journal of Science and Mathematics Education*, 8(4), pp.565–592.

Donnelly, D., McGarr, O. and O'Reilly, J. (2014) '"Just be quiet and listen to exactly what he's saying": conceptualising power relations in inquiry-oriented classrooms', *International Journal of Science Education*, 36(12), pp.2029–2054.

Flick, L. and Lederman, N. (2006) *Scientific inquiry and nature of science: implications for teaching, learning, and teacher education*. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Garrard, J. (2017) *Health sciences literature review made easy: the matrix method*. 5th edn. Burlington, Massachusetts: Jones and Bartlett Learning.

Grant, M. and Booth, A. (2009) 'A typology of reviews: an analysis of 14 review types and associated mythologies', *Health Information and Libraries Journal*, 26(7), pp.91–108.

Grob, R., Holmeier, M. and Labudde, P. (2017) 'Formative assessment to support students' competences in inquiry-based science education', *Interdisciplinary Journal of Problem-Based Learning*, 11(2), pp.120–135.

Guba, E.G. and Lincoln, Y.S. (1989) *Fourth generation evaluation*. London: Sage.

Harlen, W. (2013) 'Assessment and inquiry-based science education: issues in policy and practice', *Trieste: Global Network of Science Academies (IAP) Science Education Programme (SEP)*. [Online] Available at: https://www.interacademies.org/sites/default/files/publication/ibse_assessment_guide_iap_sep_0.pdf (Accessed: 15 December 2021).

Harrison, C. (2014) 'Assessment of inquiry skills in the SAILS project', *Science Education International*, 25(1), pp.112–122.

Hong, Q., Pluye, P., Bujold, M. and Wassef, M. (2017) 'Convergent and sequential synthesis designs: implications for conducting and reporting systematic reviews of qualitative and quantitative evidence', *Systematic Reviews*, *6*(1), pp.61–75.

Looney, J.W. (2011) 'Integrating formative and summative assessment: progress toward a seamless system?', *OECD Education Working Papers*. [Online] Available at: https://files.eric.ed.gov/fulltext/ED529586.pdf (Accessed: 9 January 2022).

Matuk, C. and Linn, M. (2018) 'Why and how do middle school students exchange ideas during science inquiry?', *International Journal of Computer-Supported Collaborative Learning*, 13(3), pp.263–299.

Moher, D., Stewart, L. and Shekelle, P. (2015) 'All in the family: systematic reviews, rapid reviews, scoping reviews, realist reviews, and more', *Systemic Reviews,* 4(1), pp.183–205.

National Council for Curriculum and Assessment (NCCA) (2015) *Focus on learning: learning intentions and success criteria.* [Online] Available at: https://ncca.ie/media/1927/assessment-workshop-1_en.pdf (Accessed: 7 February 2022).

Organization for Economic Cooperation and Development (OECD) (2013) *Synergies for learning: an international perspective on evaluation and assessment*. [Online] Available at:

https://www.oecd.org/education/school/Evaluation_and_Assessment_Synthesis_Report.pdf (Accessed: 20 March 2022).

Paré, G., Trudel, M.C., Jaana, M. and Kitsiou, S. (2015) 'Synthesizing information systems knowledge: a typology of literature reviews', *Information & Management*, 52(2), pp.183–199.

Psycharis, S. (2016) 'The impact of computational experiment and formative assessment in inquiry-based teaching and learning approach in STEM education', *Journal of Science Education and Technology*, 25(2), pp.316–326.

Russell, M. (2010) 'Technology-aided formative Assessment of Learning', in *Handbook of formative assessment*. New York: Routledge.

Rocard, P. (2007) *Science education now: a renewed pedagogy for the future of Europe*. Brussels: European Commission.

Taibu, R., Mataka, L. and Shekoyan, V. (2021) 'Using PhET simulations to improve scientific skills and attitudes of community college students', *International Journal of Education in Mathematics, Science and Technology*, 9(3), pp.353–370.

Toronto, C. and Remington, R. (2020) *A step-by-step guide to conducting an integrative review*. New York: Springer International Publishing.

Torraco, R. (2016) 'Writing integrative literature reviews: using the past and present to explore the future', *Human Resource Development Review*, 15(4), pp.404–428.

Tranfield, D., Denyer, D. and Smart, P. (2003) 'Towards a methodology for developing evidence-informed management knowledge by means of systematic review', *British Journal of Management*, 14(6), pp.207–222.

Van der Kleij, F.M., Cumming, J.J. and Looney, A. (2018) 'Policy expectations and support for teacher formative assessment in Australian education reform', *Assessment in Education: Principles, Policy & Practice*, 25(1), pp.620–637.

Wallace, C. and Kang, N. (2004) 'An investigation of experienced secondary science teachers' beliefs about inquiry: an examination of competing belief sets', *Journal of Research in Science Teaching*, 41(5), pp.936–960.

Whittemore, R. and Knafl, K. (2005) 'The integrative review: updated methodology', *Journal of Advanced Nursing*, 52(5), pp.546–553.

An Integrative Literature Review: Exploring Strategies to Implement the Principles of the Self-Determination Theory to Motivate Children to Learn and Enjoy Mathematics

Catherine Curtin

Biography

Catherine Curtin graduated with a Bachelor of Science (Hons) Degree in Microbiology from University College Cork and has worked for over 15 years in pharmaceutical laboratories and manufacturing operations in various multinationals in Ireland. Catherine completed a Master's in Biopharmaceutical Science from Sligo Institute of Technology while working full-time in 2014. She chose to change career and pursue teaching after a very positive experience in teaching science to local primary school students as part of the Junior Achievement Programme. Graduating with a First-Class Honours in the Professional Master of Education (PME) from Hibernia College in 2021, Catherine is looking forward to sharing her interests in science, sports, music and Irish with her students.

An Integrative Literature Review: Exploring Strategies to Implement the Principles of the Self-Determination Theory to Motivate Children to Learn and Enjoy Mathematics, by Catherine Curtin

Research supervisor: Caoimhe Chapman

Abstract

Motivation is a critical factor in learning. The focus of this report was to explore how teachers can promote internal motivation in children, specifically in relation to teaching mathematics. Following an integrative review process, twelve papers (n = 12) were selected and analysed thematically in the context of wider research and policy literature to identify strategies that could help foster intrinsic motivation. Findings included benefits to student motivation associated with teacher professional development, a collaborative classroom environment, use of digital game-based technology, and an integration of arts subjects into mathematics teaching. This review provides direction for future policy, research and teacher practice to help motivate children to learn and enjoy mathematics.

Keywords: motivation, intrinsic, extrinsic, self-determination, autonomy, competence, relatedness, regulation

Introduction and Background

This article explores the literature to determine how best to motivate and promote mathematical learning, especially within an Irish context. It defines motivation, identifies factors that influence motivation and explores how these can be applied to the classroom environment. It also includes the research question based on the initial exploration of mathematical policy and research literature.

Defining Motivation in Learning

Motivation is a critical factor in learning and describes the direction, intensity and quality of actions needed to complete a task (Maehr and Meyer, 1997). Within all five motivation theories, and as outlined in Figure 1, competence, social and cognitive elements, attributions, and task value are common themes (Cook and Artino, 2016). Self-determination theory uses reasons behind actions to categorise motivation into amotivation or lack of motivation, extrinsic motivation (motivation driven by external factors) and intrinsic motivation (motivation driven by a person's need to be competent and self-determining) (Deci and Ryan, 1985). As a researcher, intrinsic motivation — a part of the self-determination theory — matches the type of motivation observed during the Foundations of Education Observation week and, subsequently, informs the main focus of this dissertation.

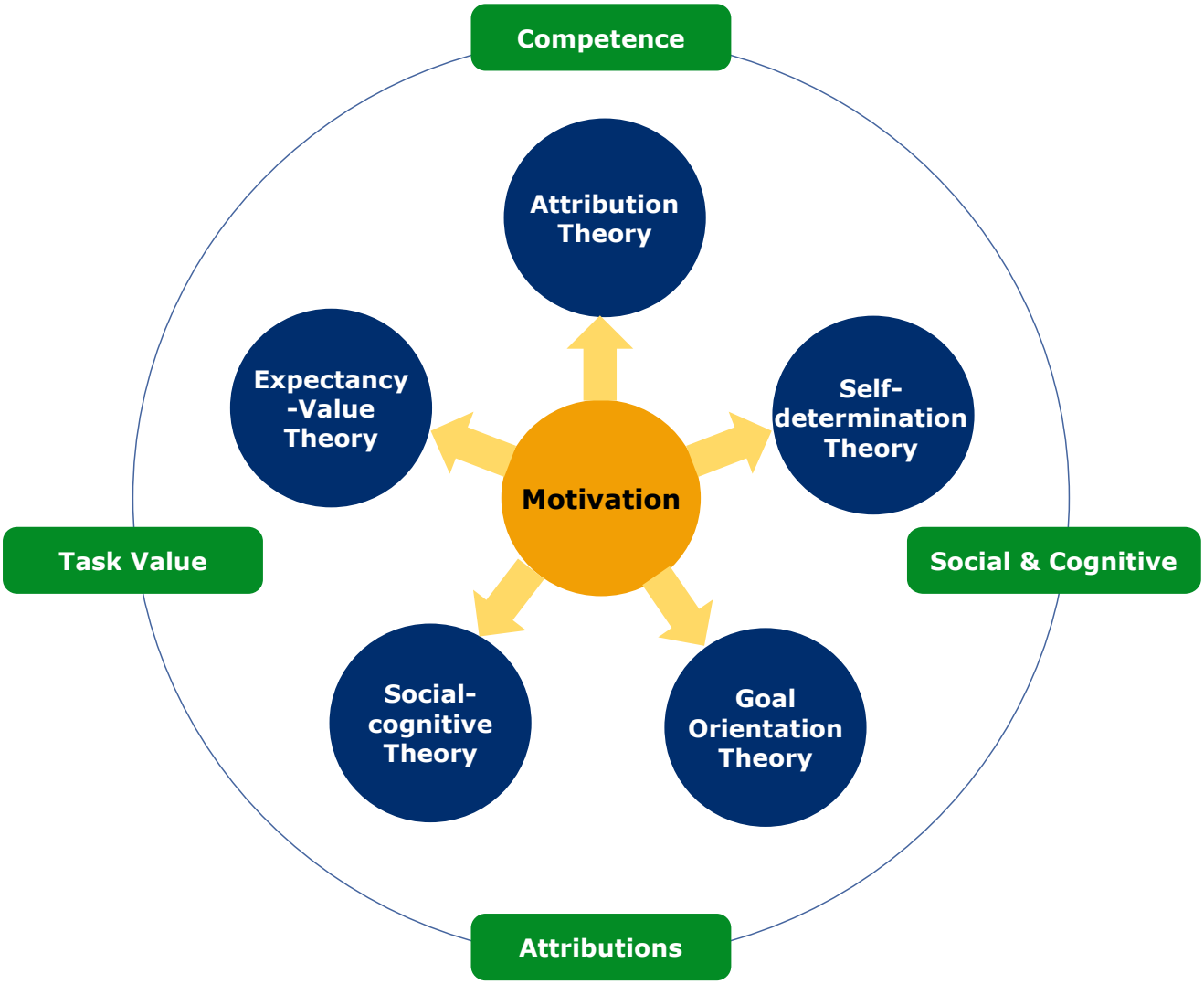


Figure 1: Five motivation theories and common themes

Promotion of Intrinsic Motivation in the Mathematical Classroom

Intrinsic motivation can be triggered by a child's sense of curiosity, a challenge or from enjoyment and is positively associated with childhood learning and academic achievement in mathematics (Denissen, Zarrett and Eccles, 2007). It has been argued that extrinsic motivation contrasts with and only shows a moderate correlation with intrinsic motivation because of its association with negative academic outcomes (Lepper, Henderlong and Iyengar, 2005). However, Ryan and Deci (1985) claim that intrinsic and extrinsic motivation belong to the same motivational spectrum. There are four different levels of extrinsic motivation, as shown in Figure 2, and each is classified by the ability of a person to become intrinsically motivated by an internalisation of external values and goals into one's sense of self. It is essential that teachers understand the different types of extrinsic motivation, adopt more active and agentic extrinsic motivation strategies, and create optimal conditions to promote internalised and integrated regulation (Ryan and Deci, 2000). Cognitive evaluation theory, a sub-theory of self-determination theory,

was developed to propose that the fulfilment of the basic psychosocial needs of autonomy, competence and relatedness help to foster both intrinsic motivation and internalised and integrated regulation, as displayed in Figure 2 (Deci and Ryan, 1985).

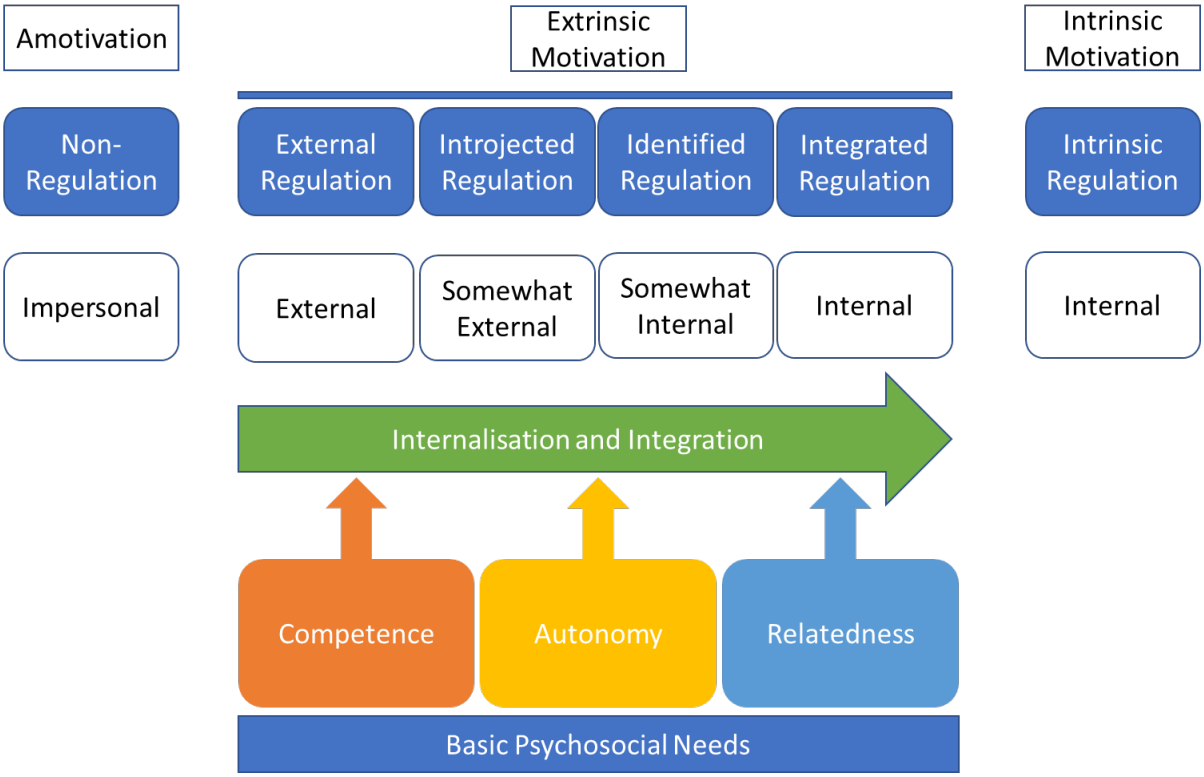


Figure 2: Self-Determination Theory (Ryan and Deci, 2000)

Autonomy

Feelings of autonomy arise when a child's values align with their behaviour, which occurs when a child is given the opportunity to choose between meaningful options while feeling personal responsibility for their actions (Almut and Mueller, 2017). Higher levels of engagement, better understanding of concepts, increased academic achievement and improved psychological well-being have been reported in children taught by autonomy-supportive teachers (Reeve, 2009). This teacher instruction style is focused on the child's internal goals; interests; choice making; and use of clear, flexible and competent-based informational language while placing importance on the child's perspectives and emotions (Reeve, 2009).

Competence

Subject knowledge and connectionist beliefs were the strongest predictors of a teacher's competence or self-efficacy beliefs (Muijs and Reynolds, 2015). A child's self-efficacy beliefs are related to their confidence to formulate and execute a plan to resolve a problem or complete a specific task (Bandura, 1997). As shown in Figure 3, the most

powerful source of competence or self-efficacy is the learner's interpretation of previous task accomplishments, followed by observation of a person completing the task, followed by verbal persuasion, with the learner's own physiological state being the least powerful source of self-efficacy (Bandura, 1997).

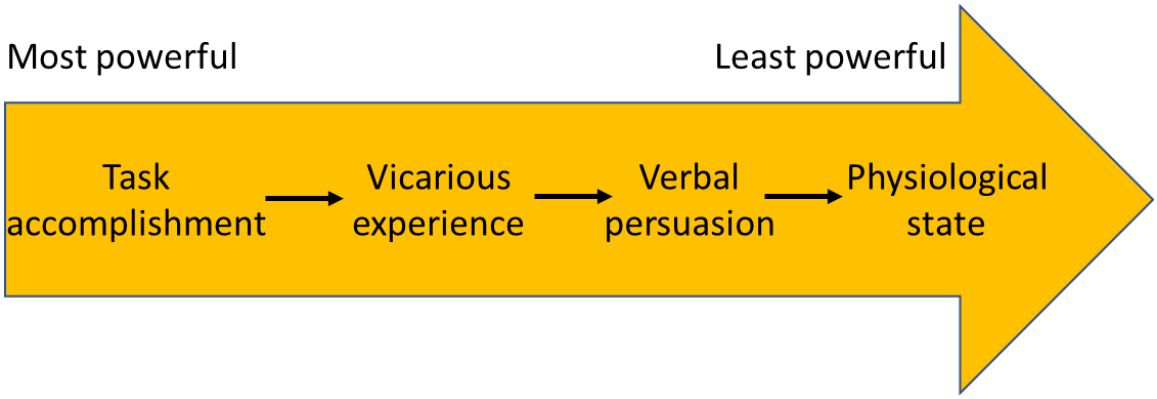


Figure 3: Sources of Self-Efficacy Beliefs (Alderman, 2013)

Relatedness

Relatedness is concerned with a child's sense of belonging, which impacts how well a child internalises goals or values, because this process is dependent on how much a child feels connected to or wants to feel connected to other people in their learning environment (Cook and Artino, 2016). A child's sense of relatedness is heavily dependent on if they think a teacher likes, respects and values them, with positive teacher perceptions associated with children using internal motivation (Niemiec and Ryan, 2009).

National Mathematical Policy and Research

Both the National Assessments of Mathematics and English Reading (NAMER) and Trends in International Mathematics and Science Study (TIMSS) have been used to identify areas of concern in relation to the teaching of mathematics. Results from the 2009 NAMER report indicate a policy and training gap in relation to effective mathematical teaching practices and motivation (ERC, 2010). In response, the DES issued a national strategy to improve numeracy in 2011 (DES, 2011). Following this, TIMSS results still indicate that there is a gap between policy and the teacher's ability to motivate children during mathematical lessons (Clerkin, Perkins and Chubb, 2017). In response, the DES completed an interim review of the 2011 Literacy and Numeracy Strategy targets so that new targets could be put in place for 2020 (DES, 2017).

The National Council for Curriculum and Assessment (NCCA) endorses good mathematics pedagogy and overarching or meta-practices including the use of productive mathematical dialogue, developing a positive mathematical mindset, and the use of appropriately challenging tasks and assessment (NCCA, 2014). Showing the importance of these meta-practices to the Irish context, the NCCA has included them in the draft specification for the new Primary Mathematics Curriculum. The NCCA has also issued practical guidelines to help teachers understand the personal and academic challenges encountered by children with learning disabilities (NCCA, no date).

The Professional Development Service for Teachers (PDST) has provided an instructional framework aligned with the principles of the curriculum to support and extend higher-order mathematical skills (PDST, 2020). These resources provide practical guidance to teachers on how best to support and progress mathematical thinking, cultivate a positive learning environment, suggest helpful resources, and clarify important teaching and assessment strategies (PDST, 2013). These manuals should help to satisfy Irish children's basic psychosocial needs of autonomy, competence and relatedness and foster children's intrinsic motivation towards mathematics. Good mathematics pedagogy that promotes motivation is described in national policies, the mathematical curriculum and in teacher resources. However, evidence suggests that there is a gap between the information provided and teacher motivational practices in the classroom. This exploratory process resulted in the following research question:

What strategies could be used to implement the principles of the self-determination theory to motivate children to learn and enjoy mathematics?

Methodology

The Integrative Review (ILR) Process

Cooper (1998) presented a structured integrative review process to order, classify, categorise and summarise different primary data sources to help answer a specific research question. The five steps of the integrative review process (Whittemore and Knafl, 2005) include:

1. Problem identification/formulation
2. Literature search
3. Data evaluation
4. Data analysis
5. Presentation of conclusions

Step One — Problem Formulation

The research topic for this integrative review was inspired by a positive school placement teaching observation. Background literature, national policy and research were explored to gain better understanding of the psychological factors, teaching methods, behaviours and Irish context associated with the promotion of internal motivation when teaching children mathematics. Critical reflection of these readings and consultation with the dissertation supervisor helped to clarify the scope, purpose and formulation of a specific research question for this study.

Step Two — Literature Search, and Step Three — Evaluation

As detailed in Table 1, twelve key terms were recorded during the initial literature and policy review process, which were combined with specific terms to focus the literature search on primary school education and then edited using Boolean logic. These edited key terms were then inserted into either the abstract, subject, keywords or anywhere search fields of Education Source, Academic Search Complete (both located in EBSCOhost) and Taylor and Francis databases on separate occasions to search for relevant literature.

Table 1: Key Terminology Inserted into Education Source, Academic Search Complete and Taylor and Francis Databases

Database Search Field	Key Terminology
1	Mathematic*
2	"self-determination theory" OR motivati* OR "cognitive evaluation theory" OR "autonomy" OR "relatedness" OR "competence" OR "self-efficacy" OR "self-regulation" OR "integrated regulation" OR "internalised regulation" OR "internalized regulation"
3	"primary school" OR "elementary school" OR "primary education" OR "grade school" OR "grammar school" OR "national school"

As stipulated in the Dissertation Handbook 2020/2021, the literature search only included peer-reviewed empirical papers that had been published in the last ten years, that met all dissertation inclusion criteria listed below and that were extracted from the databases named above. As detailed in Table 2, sixty-two papers were found in Education Source, seventy-nine papers were found in Academic Search Complete and forty-five papers were found in Taylor and Francis, giving a total of 186 papers. The next step of the literature search involved reading the paper titles and abstracts against specific inclusion criteria, including:

- Relevance to the research question
- Sufficient background and context information provided
- Well-defined study methodology
- Provision of study participant details
- A sample size and sampling strategy suitable for the study parameters
- Robust and logical data analysis process
- Discussion of study limitations

Table 2: Integrative Review Literature Search Summary

Database/Source	Records Screened	Abstracts Read	Articles Read/Evaluated	Included
Education Source	62	31	8	2
Academic Search Complete	79	27	8	5
Taylor and Francis	45	15	7	5
Total	186	73	23	12

Step Four — Analysis and Step Five — Presentation

For the final twelve papers selected, a summary table was constructed that recorded the authors, purpose, sample details, methodology and the paper findings/summary. Thematic analysis, according to the method outlined by Braun and Clarke (2006), was completed on these papers to identify data patterns. First, all papers were read multiple

times to obtain familiarity and take notes of emerging ideas, which was followed by the generation and collation of initial codes for the whole data set. The collated codes were then gathered and grouped into different potential themes. These themes were then checked and reviewed against the coded extracts, which was then used to develop a thematic map of the whole data set. Each theme was then analysed to refine the theme details in relation to the broader data context and its ability to help answer the research question.

Findings and Discussion

Summary and Critique of Selected Papers

The final twelve papers for this study covered a seven-year timeframe (2013–2020). The methodological design of the studies covered in these papers included qualitative, quantitative and mixed methodology study approaches. The data was taken from primary school students (2^{nd}–6^{th} grade) and primary school teachers in multiple different countries. The sample sizes in these papers ranged from the smallest at 24 students up to maximum of 2,148 students. In general, the majority of these studies either included a control group of students or compared the same group of students directly via pre- and post-lesson delivery testing. Four of these papers included teachers as part of the studies, and the sample size ranged from 2 to 103 teachers. The different authors, the purpose, study sample details, methodological approach and summary of findings are outlined in Table 3.

Table 3: Summary of Selected Papers

	Article Title	Author(s) (Year of publication)	Purpose	Participants	Methodology	Findings/Summary
1	A Multi-Method Investigation of Mathematics Motivation for Elementary Age Students	Linder, Smart, Cribbs (2015)	Explored student, teacher and classroom internal and external factors with the potential to positively influence high levels of motivation for mathematics	Phase 1: 288 Second through to Fifth Grade students Phase 2: 20 Fifth Grade students (selected based on phase 1 findings)	Mixed-method design; quantitative approach in phase 1 using survey to measure motivation levels; qualitative approach in phase 2 using semi-structured interviews, transcripts and videos of mathematics instruction	Importance of teacher practice to establish a safe mathematical learning environment, encourage students' present and future value for mathematics, form connections between mathematics and real-life use, and reduce external stress related to mathematics to promote student motivation
2	Embedding diagnostic mechanisms in a digital game for learning mathematics	Huang, Huang and Wu (2014)	Examined the impact of digital game-based learning on mathematical learning performance, learning anxiety, learning motivation and learning satisfaction	56 (29 in experimental group and 27 in control group) Grade 2 primary school children	Mixed-method design; quantitative approach in pre-test, post-test, weekly quiz and questionnaire; qualitative approach for interview	The addition of a diagnostic mechanism to a digital game reduced mathematics anxiety, improved problem-solving skills, enhanced motivation and improved mathematical performance
3	Mathematics, mastery and metacognition: How adding a creative approach can support children in maths	Bonnett, Yuill and Carr (2017)	Measured how a mastery-orientated teaching approach can encourage metacognition, and improve motivation and understanding of mathematical concepts and performance	24 Year 4 primary school children	Mixed-method design; quantitative pre- and post-test maths test; qualitative semi-structured interviews	Significant improvement in mathematics performance recorded and, in girls, mathematical motivation levels. The importance of teamwork, listening, persistence and asking for help were key themes in final interviews.

4	The effect of programming on primary school students' mathematical and scientific understanding: educational use of mBot	Sáez-López, Sevillano-García and Vazquez-Cano (2019)	Investigated the effects of programming on primary school students' mathematical understanding	93 Sixth Grade primary school students	Mixed-method design; combination of qualitative and quantitative assessment (maths test, descriptive analysis) with participant observation	Statistically significant improvements in mathematics curriculum area with integration of programming and robotics. Particularly positive results in sequences and conditionals. Motivation, commitment, fun, participation and interest in the subject matter increased. Immediate feedback and response of the robot is a powerful and highly motivational tool for students.
5	The Role of Beliefs and Motivational Variables in Enhancing Word Problem Solving	Pongsakdi, Laakkonen, Laine, Veermans, Hannula-Sormunen and Lehtinen (2019)	Investigated the impact of a Word Problem Enrichment (WPE) programme on student cognitive, motivation and belief factors	10 teachers and 170 Fourth and Sixth Grade students from elementary schools	Quantitative word problem-solving test, motivation questionnaire and word problem-solving beliefs questionnaire	Results showed that the effects of WPE depend on students' initial motivation level. The impacts of the WPE on student beliefs were found only in students with a low initial motivation level, while impacts on student problem-solving performance were found only in students with a high initial motivation level.
6	Fostering Elementary Students' Mathematics Disposition through Music-Mathematics Integrated Lessons	An, Tillman, Boren and Wang (2014)	Investigated the impact of integration of music on mathematics achievement and dispositions (beliefs about success, attitude, confidence, motivation and usefulness)	56 Third Grade elementary school students and 2 teachers	Mathematics-integrated activities with qualitative pre-test and post-test mathematics disposition survey	Statistically significant improvements from pre-test to post-test for confidence, success and motivation

7	Teachers' Beliefs and Behaviors: What Really Matters?	Muijs and Reynolds (2015)	Examined the impact of teacher behaviors, teacher beliefs, teacher self-efficacy, and teacher subject knowledge on student achievement in mathematics	103 primary school teachers and 2,148 primary school students	Mixed-method design; quantitative numeracy test and questionnaire; qualitative teacher observation	Teacher behaviour directly impacted student achievement. Teacher beliefs had a significant influence on student achievement through teacher behaviour. Teacher self-efficacy and subject knowledge impacted teacher behaviours.
8	Motivational and affective determinants of self-regulatory strategy use in elementary school mathematics	Chatzistamatiou, Dermitzaki, Efklides and Leondari (2015)	Investigated the connection between a child's self-regulatory strategies (including self-motivation) and their self-efficacy in, value and enjoyment of maths	344 Fifth and Sixth Grade primary school students	Quantitative questionnaires	Self-regulatory strategy use in mathematics was positively and directly related to self-efficacy, value and enjoyment of mathematics. Students' enjoyment of maths was affected only by mastery goals, not performance goals.
9	The Benefits of Fine Art Integration into Mathematics in Primary School	Brezovnik (2015)	Researched the effects of the integration of fine art content into mathematics	210 Fifth Grade primary school students	Fine art content integration into mathematics lessons followed by multiple quantitative post-lesson testing	Fine art content integration into mathematics lessons allowed students to achieve better results in mathematics testing.
10	Teacher-student relationship and mathematical problem-solving ability: mediating roles of self-efficacy and mathematical anxiety	Zhou, Du, Hau, Luo, Feng and Liu (2020)	Examined interrelations among teacher-student relationship, self-efficacy, maths anxiety and mathematical problem-solving ability	1,667 Fifth Grade students	Quantitative self-report questionnaire and mathematical problem tests	The teacher–student relationship had a direct and positive effect on students' mathematical problem-solving ability. Self-efficacy mediated the effects of the teacher–student relationship on mathematical problem-solving ability. Self-efficacy reduced mathematical anxiety, both of which mediated the effects of the teacher–student relationship on mathematical problem-solving ability.

11	Designing of Authentic Learning Mediated by Mobile Technology for Primary School Learners	Grace and Lee (2014)	Implementation of a blended model of learning that integrates mobile technology and authentic learning in learning tasks for primary school students (using real-world problems) and determining the effects on students	270 primary school students and 9 teachers	Mixed-methods design; quantitative data (in the form of students' after-programme evaluation survey); and qualitative data (students' written reflection with teachers' observations)	Paper shows a link between authentic learning and self-determination and the synergy between mobile technology to authentic learning. Authentic learning mediated by mobile technology leads to feeling of relatedness, autonomy and competence and, thus, contributes to students' self-determination.
12	A microworld-based role-playing game development approach to engaging students in interactive, enjoyable and effective mathematics learning	Wang, Chang, Hwang and Chen (2018)	Developed a microworld-based educational game that provides simulated contexts encouraging students to explore mathematics knowledge	107 Sixth Grade elementary students	Quantitative learning performance tests and questionnaires	Microworld-based gaming approach can significantly advance students' learning performance and learning motivation.

Themes and Discussion

As shown in Figure 4, analysis of the literature generated four main themes:

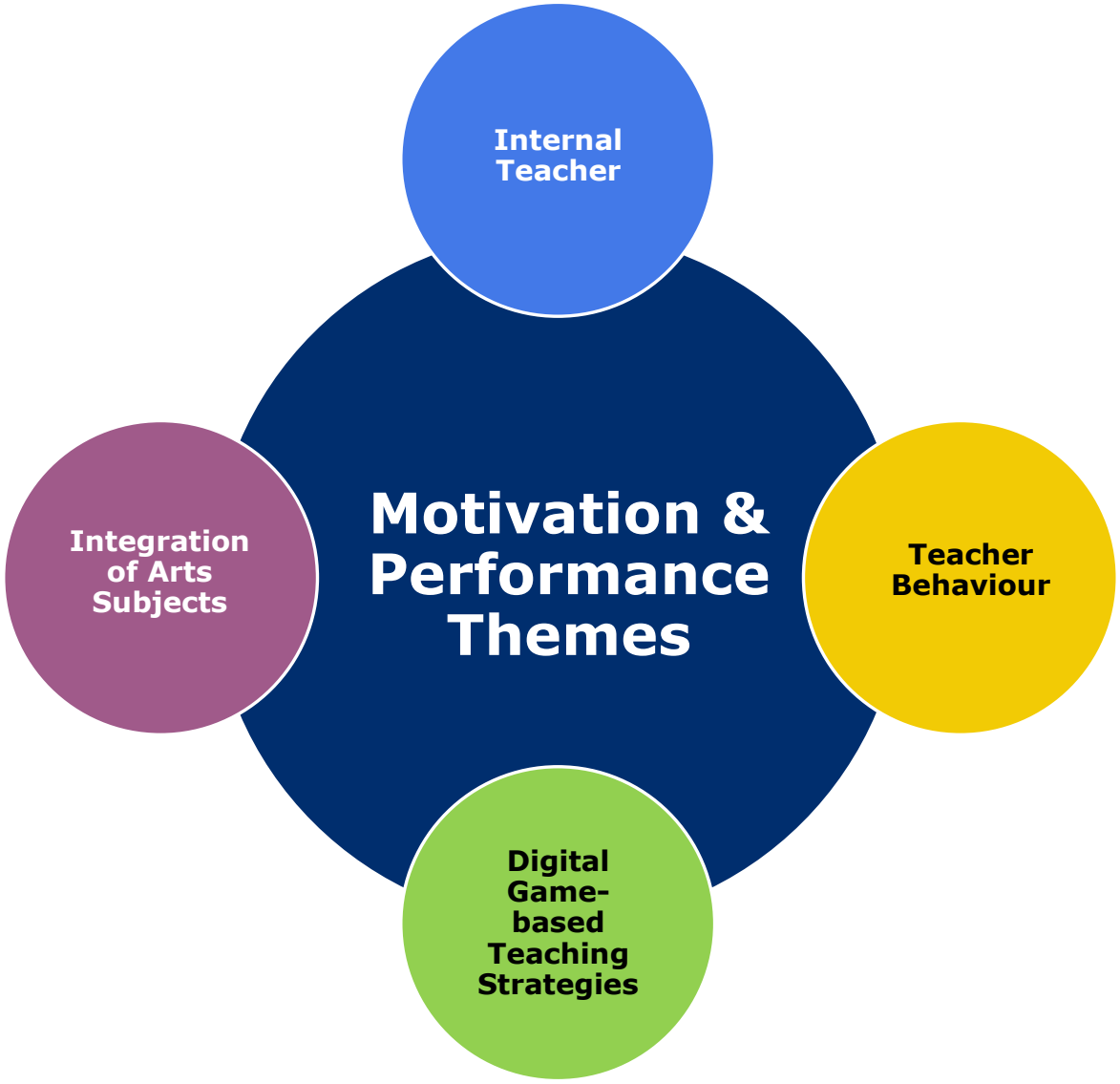


Figure 4: Themes Related to Increased Motivation and Improved Mathematic Performance

Internal Teacher Variables that Impact Mathematical Self-efficacy and Competence

Teachers have reported the negative impact of earlier fundamentalist educational experiences that either did not communicate the mathematical relevance, were focused on mathematical performance or caused teachers to label themselves as 'not a maths person' on their own self-efficacy (Hudson, Henderson and Hudson, 2015). As shown in Figure 5, external teacher behaviours, such as the ability to establish a supportive classroom environment and to select appropriate teaching strategies that motivate and improve a child's mathematical performance, are driven by internal teacher processes.

This concept is supported by the wider literature, where a child's interest in mathematics is positively influenced when a teacher believes that either mathematics is important or that the child is performing to their mathematical potential or that the child has innate abilities in mathematics (Upadyaya and Eccles, 2014). In addition, a teacher's connectionist orientation was positively associated with mathematical achievement and strongly predicted both constructivist and behaviourist teaching strategies (Muijs and Reynolds, 2015). Continuous professional development programmes that facilitate teachers to complete action research, critically reflect on their practice and share knowledge with other teaching professionals have proven to allow teachers to better understand mathematical content and select teaching strategies to promote children's mathematical thinking (Llinares and Krainer, 2006). From an Irish policy context, the PDST provides a range of courses and instructional mathematical handbooks that outline specific child-led teaching strategies to promote intrinsic mathematical motivation in children. However, only 30% of Irish teachers had completed six hours or less of continual professional development training, and 28% of Irish teachers had not completed any continual professional development training in the two years prior to the TIMSS in 2015 (Clerkin, Perkins and Chubb, 2017). Also, 73% of Fourth Class children reported that they listen to teachers explain mathematical content, and 57% of Fourth Class children listen to the teacher explain how to solve mathematical problems in every or almost every lesson (Clerkin, Perkins and Chubb, 2017). This narrow teacher-led approach will not allow children to actively discover mathematical concepts or enable them to meet their psychosocial needs of autonomy, competence and relatedness in the mathematical classroom.

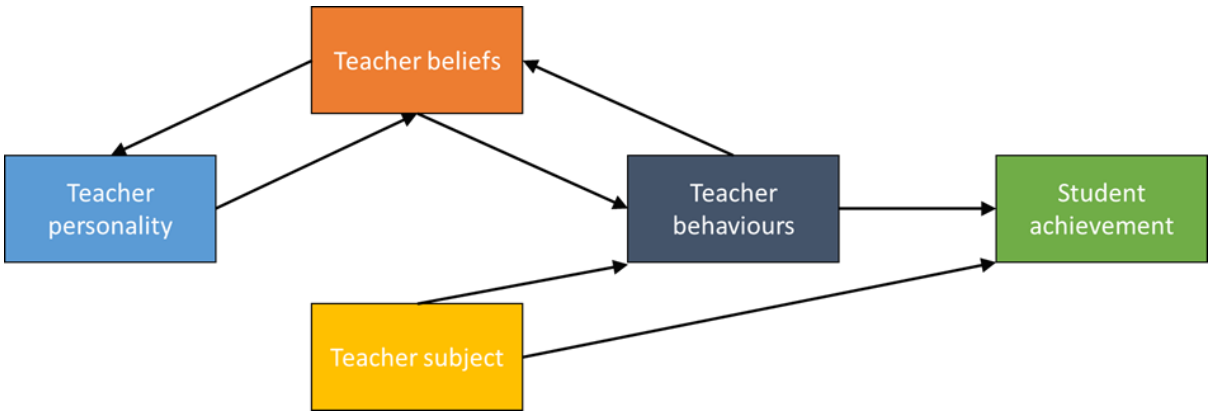


Figure 5: Relationship Between Internal and External Teacher Characteristics on Student Achievement in Mathematics (Muijs and Reynolds, 2015)

Teacher Behaviours that Facilitate a Positive Classroom Environment

Peer collaboration and the promotion of self-regulation are important teaching strategies used to motivate children. Linder, Smart and Cribbs (2015) showed that children with high levels of motivation in mathematics were taught by a teacher who prioritised a respectful classroom environment during group work and also promoted collaboration among children. This teacher viewed children's mistakes as a group learning

opportunity; she ensured not to give the student the answer directly, but instead asked 'open-ended' questions and encouraged children to initiate a group discussion with their peers to solve the problem (Linder, Smart and Cribbs, 2015). This ensured that children felt comfortable to challenge and provide alternative solutions to their teacher and peers, and it helped develop their problem-solving skills, decrease mathematical anxiety and increase their self-efficacy (Linder, Smart and Cribbs, 2015). Similar mathematical performance results were observed in a study that adopted a mastery-orientated teaching approach, which was shown to positively and directly relate to self-efficacy, value and enjoyment of mathematics (Chatzistamatiou et al., 2015). This study found that a student's enjoyment of mathematics was affected only by mastery goals, not performance goals, and a link was shown between the student's enjoyment of learning mathematics and the strategy for enhancing metacognition and reflection (Chatzistamatiou et al., 2015). Therefore, teachers should create classroom environments that encourage children to use both collaborative learning and self-regulatory strategies so that they are engaged and motivated to learn and enjoy mathematics.

Provision of Authentic and Engaging Learning Experiences using Digital Game-based Teaching Strategies

Children should be provided with opportunities to apply their mathematical knowledge to practical problems. As outlined in Figure 6, Wang et al. (2018) utilised digital technology to successfully integrate mathematical content into a problem-solving, microworld-based mathematics game based on the familiar story of the 'Hare and the Tortoise'. Children showed significantly better learning achievement, significantly higher motivation rating and significantly higher technology acceptance levels than children using a teacher-guided approach (Wang et al., 2018). Similar levels (93%) of motivation to learn more, as well as feelings of relatedness to their classmates, high levels of mathematical competence and autonomy for their own learning were recorded for children challenged with an authentic learning experience using mobile technology (Grace and Lee, 2014). The challenge of task-related problems, the mobile nature of the digital technology used, and the incorporation of quizzes and songs caused children to ask relevant mathematical questions, self-assign team roles and enjoy mathematics in an authentic setting.

Figure 6: Gaming Interface of 'Speedy World' Game (Wang et al., 2018)

As shown in Figure 7, Huang, Huang and Wu (2014) merged an Input-Process-Outcome Game Model into different digital real-life transactions that used children's answers to identify the type of mistake and provide a prompt and more detailed constructive feedback. This additional support resulted in a significant positive difference in the children's learning achievement and in their levels of mathematics anxiety (Huang, Huang and Wu, 2014). Sáez-López, Sevillano-García, and Vazquez-Cano (2019) used robotics to extend digital game-based learning into a three-dimensional environment. This resulted in significant improvements in mathematical test results; positive results for critical thinking; particularly positive results for elements of fun, commitment, participation, interest and motivation; but outstanding results for active teaching learning methods and problem solving (Sáez-López, Sevillano-García, and Vazquez-Cano, 2019). The ability of children to actively participate and physically engage with robotics could help explain this study's exceptional results.

Figure 7: Diagnostic Mechanism of Digital Game-based Learning System (Huang, Huang and Wu, 2014)

The European Commission Joint Research Centre, while acknowledging the benefits associated with digital technology to enhance pupil interest and engagement, have also raised specific concerns relating to comprehensive integration as well as a lack of consolidated understanding, supportive policy and systematic rollout of this technology (JRC, 2016). The Department of Education and Skills (DES) published a digital strategy document, which outlined a plan to incorporate technology and digital tools into learning and assessment practices through teacher training, policy updates and the provision of appropriate technology infrastructure (Ireland. DES, 2015). 92% of Irish teachers believe that learning about digital technology is necessary in school and that the open nature of digital based learning creates a less stressful child-led learning environment, promotes peer collaboration and increases children's levels of task engagement (NCCA, 2019). However, while acknowledging these advantages, Irish teachers also emphasised that curriculum overload, along with teacher self-efficacy, professional development and school infrastructure were the main challenges to implementing this type of digital based learning (NCCA, 2019).

Effective Integration of Arts Subjects to Engage All Learners

Children who took part in a programme that combined the teaching of mathematical concepts with creative visual art sessions showed increased metacognitive reflection on learning strategies, a significant improvement in mathematical performance and a significant increase in perceived mathematical motivation in girls (Bonnett, Yuill and Carr, 2017). This study showed how mastery-orientated teaching strategies focused on the learning process can help motivate different types of learners to listen to each other, ask for help and positively change their perception of mathematics. As outlined in Figure 8, visual art was also successfully used to explore and visually apply the mathematical concepts of equations, inequations, powers and perimeter, which resulted in statistically significant improvement in mathematical academic achievement (Brezovnik, 2015). Another study, which extended the concept of an active, creative and visually stimulating learning environment to include aural learning, demonstrated that the different mathematical dispositional elements of confidence, attitude, usefulness, success, motivation and children's beliefs made statistically significant improvements from pre-test to post-test (An et al., 2014). The positive results from these studies show how a multi-sensory integrated teaching approach can be used to first engage and then motivate children to learn mathematical concepts.

Figure 8: Children's Visual Interpretation of Mathematical Concepts (Brezovnik, 2015)

Teachers need to differentiate their teaching strategies so that all types of learners feel included in mathematical lessons. Intrinsically motivated activities that are based on a child's natural curiosity to play and explore and are driven by the satisfaction and joy generated by the activity itself are likely to be responsible for the majority of learning compared to extrinsically motivated teaching strategies (Ryan and Deci, 2017). The successful integration of creative arts subjects to motivate children to engage with mathematical concepts is also a common theme reflected in the wider literature. The success of an integrated literacy, mathematics and visual arts curriculum caused teachers to recognise the ability of integration and active learning to engage children with special education needs and those that struggle academically (Cunnington et al., 2014). However, teachers did also acknowledge that challenges including busy schedules, different student ability levels, appropriate training and high levels of planning and communication between different educational professionals were encountered during this programme (Cunnington et al., 2014). Teachers should also be aware of the presence of gender differences and stereotypes in mathematics. Bonnett,

Yuill and Carr's (2017) study, which focused on using a mastery-oriented approach to encourage metacognition and improve motivation and understanding of mathematical concepts, reported a significant increase in perceived mathematical motivation in girls, but no such increase was recorded for boys in the same class. Large studies completed in Ireland have shown that both teachers and primary care givers underestimated girls' but not boys' performance in mathematics (Murray et al., 2010). Teachers should be alert during interactions with children during mathematical lessons because such biased judgments are not inclusive of all learners and could negatively affect a girl's self-efficacy, future motivation levels and academic performance.

Conclusion

The findings of this review show how different types of internal teacher processes, such as a teacher's beliefs, subject content knowledge and personality can either directly or indirectly affect external teacher behaviours and, in turn, student achievement (Muijs and Reynolds, 2015). Engaging in continual professional development training was found to positively influence teacher beliefs, attitudes and dispositions towards mathematics and increase teacher confidence to utilise various active teaching strategies (Hudson, Henderson and Hudson, 2015). Therefore, the ability of a teacher to be aware of how their own internal variables and external behaviours affect a child's levels of self-efficacy, autonomy and relatedness in mathematical lessons are important components to understand in order to answer the research question.

The papers in this review also revealed that effective integration of digital game-based technology and arts subjects with mathematical content are highly effective teaching strategies to encourage children to engage with and enjoy mathematics. Positive features of digital game-based technology included the ability to incorporate a diagnostic mechanism to give tailored, immediate feedback to children (Huang, Huang and Wu, 2014) and the use of robotics to allow children to apply mathematical concepts in an three-dimensional active learning environment (Sáez-López, Sevillano-García and Vazquez-Cano, 2019). Three-dimensional models made from newspapers were also used to integrate visual arts and introduce a 'trial and error' approach for children to experiment with mathematical ideas, gain confidence and minimise comparison of work with peers (Bonnett, Yuill and Carr, 2017). Children's mathematical self-efficacy, relatedness and autonomy were improved in another study by allowing them to discuss and actively discover mathematical concepts by creating and playing their own musical compositions in groups (An et al., 2014). These examples show how teachers can successfully integrate technology and skills developed through other subjects into mathematics lessons to create authentic learning environments that are inclusive of all types of learners.

References

Alderman, K. (2013) *Motivation for Achievement: Possibilities for Teaching and Learning.* New York and London: Routledge.

Almut, T. and Mueller, F. (2017) 'A Magic Dwells in Each Beginning? Contextual Effects of Autonomy Support on Students' Intrinsic Motivation in Unfamiliar Situations', *Social Psychology of Education*, 20(4), pp.791–805. [Online] Available at: https://www.researchgate.net/publication/319083468 (Accessed: 30 September 2020).

An, S., Tillman, D., Boren, R. and Wang, J. (2014) 'Fostering Elementary Students' Mathematics Disposition Through Music-Mathematics Integrated Lessons', *International Journal for Mathematics Teaching & Learning,* pp.1–19. [Online] Available at: https://www.cimt.org.uk/journal/an.pdf (Accessed: 19 February 2021).

Bandura, A. (1997) *Self-efficacy: The Exercise of Control*. New York: Freeman.

Braun, V. and Clarks, V. (2006) 'Using Thematic Analysis in Psychology', *Qualitative Research in Psychology*, 3(2), pp.77–101. [Online] Available at: http://dx.doi.org/10.1191/1478088706qp063oa (Accessed: 01 January 2021).

Brezovnik, A. (2015) 'The Benefits of Fine Art Integration into Mathematics in Primary School', *CEPS Journal*, 5(3), pp. 11–32. [Online] Available at: https://files.eric.ed.gov/fulltext/EJ1128967.pdf (Accessed: 18 February 2021).

Bocconi, S., Chioccariello, A., Dettori, G., Ferrari, A. and Engelhardt, K. (2016) 'Developing Computational Thinking in Compulsory Education: Implications for Policy and Practice', *JRC Science for Policy Report*. [Online] Available at: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC104188/jrc104188_computhinkreport.pdf (Accessed: 18 February 2021).

Bonnett, V., Yuill, N. and Carr, A. (2017) 'Mathematics, Mastery and Metacognition: How adding a Creative Approach can Support Children in Maths', *Educational & Child Psychology*, 34(1), pp.83–93. [Online] Available at: https://repository.canterbury.ac.uk/download/2afaf22809562c2fd10d43be8d96ad409a6e7efc5d22ff2368ef30817c4bd535/247881/15335_Math-mastery%20and%20metacognition-Bonnett%252c%20Carr%20%20Yuill%202017%20%281%29.pdf (Accessed: 15 February 2021).

Chatzistamatiou, M., Dermitzaki, I., Efklides, A. and Leondari, A. (2015) 'Motivational and Affective Determinants of Self-regulatory Strategy use in Elementary School Mathematics', *Educational Psychology*, 35(7), pp.835–850. [Online] Available at: https://www.tandfonline.com/doi/pdf/10.1080/01443410.2013.822960?needAccess=true (Accessed: 05 April 2021).

Chen, N. and Hwang, G. (2014) 'Transforming the Classrooms: Innovative Digital Game-based Learning Designs and Applications', *Educational Technology Research and Development*, 62(2), pp.125–128. [Online] Available at: https://doi.org/10.1007/s11423-014-9332-y (Accessed: 18 February 2021).

Clerkin, A., Perkins, R. and Chubb, E. (2017) 'Inside the Primary Classroom: What Happens in Fourth Class?', *ERC Research Series: Report 2*. [Online] Available at: http://www.erc.ie/wp-content/uploads/2017/12/Inside-the-primary-classroom-online-final-version.pdf (Accessed: 03 October 2020).

Clerkin, A., Perkins, R. and Cunningham, R. (2016) *TIMSS 2015 in Ireland: Mathematics and Science in Primary and Post-primary Schools*. [Online] Available at: http://www.erc.ie/wp-content/uploads/2016/11/TIMSS-initial-report-FINAL.pdf (Accessed: 03 October 2020).

Cook, D. and Artino, A. (2016) 'Motivation to Learn: An Overview of Contemporary Theories', *Medical Education*, 50(10), pp.997–1014. [Online] Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/medu.13074 (Accessed: 11 September 2020).

Cooper, H. (1998) *Applied Social Research Methods. Synthesizing Research: A Guide for Literature Reviews*. New York: SAGE Publications Ltd.

Creswell, J. and Creswell, D. (2018) *Research Design: Qualitative, Quantitative and Mixed Methods Approaches.* London: SAGE Publications Ltd.

Cunnington, M., Kantrowitz, A., Harnett, S. and Hill-Ries, A. (2014) 'Cultivating Common Ground: Integrating Standards-based Visual Arts, Math and Literacy in High-poverty Urban Classrooms', *Journal for Learning through the Arts,* 10(1), pp.1–26. [Online] Available at: https://files.eric.ed.gov/fulltext/EJ1050589.pdf (Accessed: 19 February 2021).

Deci, E. and Ryan, R. (1985) *Intrinsic Motivation and Self-determination in Human Behavior.* New York: Plenum.

Denissen, J., Zarrett, N. and Eccles, J. (2007) 'I like to do it, I'm able, and I know I am: Longitudinal Couplings between Domain-specific Achievement, Self-concept, and Interest', *Child Development*, 78(2), pp.430–447. [Online] Available at: https://doi.org/10.1111/j.1467-8624.2007.01007.x (Accessed: 14 September 2020).

Department of Education and Skills (DES) (2011) *The National Strategy to Improve Literacy and Numeracy among Children and Young People 2011–2020.* [Online] Available at: https://assets.gov.ie/24521/9e0e6e3887454197a1da1f9736c01557.pdf (Accessed: 02 October 2020).

Department of Education and Skills (DES) (2017*) National Strategy: Literacy and Numeracy for Learning and Life 2011–2020 — Interim Review: 2011–2016, New Targets: 2017–2020.* [Online] Available at: https://assets.gov.ie/24960/93c455d4440246cf8a701b9e0b0a2d65.pdf (Accessed: 03 October 2020).

Educational Research Centre (2020) *Studies*. Available at: http://www.erc.ie/studies/ (Accessed: 02 October 2020).

Educational Research Centre (ERC) (2010) *The 2009 National Assessments of Mathematics and English Reading.* [Online] Available at: http://www.erc.ie/documents/na2009_report.pdf (Accessed: 02 October 2020).

Grace, T. and Lee, T. (2014) 'Designing of Authentic Learning Mediated by Mobile Technology for Primary School Learners', *Journal of the International Society for Teacher Education*, 18(1), pp.42–52. [Online] Available at: https://isfte.org/wp-content/uploads/2015/07/JISTE_18.1_2014.pdf#page=42 (Accessed: 17 February 2021).

Huang, Y., Huang, S. and Wu, T. (2014) 'Embedding Diagnostic Mechanisms in a Digital Game for Learning Mathematics', *Educational Technology Research and Development,*

62(2), pp.187–207. [Online] Available at: https://doi.org/10.1007/s11423-013-9315-4 (Accessed: 17 February 2021).

Hudson, B., Henderson, S. and Hudson, A. (2015) 'Developing Mathematical Thinking in the Primary Classroom: Liberating Students and Teachers as Learners of Mathematics', *Journal of Curriculum Studies*, 47(3), pp.374–398. [Online] Available at: https://www.tandfonline.com/doi/pdf/10.1080/00220272.2014.979233 (Accessed: 15 February 2021).

Ireland. Department of Education and Skills (2015) *Digital Strategy for Schools 2015-2020: Enhancing Teaching, Learning and Assessment*. [Online] Available at: https://www.gov.ie/en/publication/f8990-digital-strategy-for-schools-2015-2020/#digital-strategy-for-schools-2015-2020 (Accessed: 18 February 2021).

Lepper, M., Henderlong, C. and Iyengar, S. (2005) 'Intrinsic and Extrinsic Motivational Orientations in the Classroom: Age Differences and Academic Correlates', *Journal of Educational Psychology*, 97(2), pp.184–196. [Online] Available at: http://people.uncw.edu/caropresoe/edn523/Lepper_MotivationStudy.pdf (Accessed: 14 September 2020).

Linder, S., Smart, J. and Cribbs, J. (2015) 'A Multi-Method Investigation of Mathematics Motivation for Elementary Age Students', *School Science & Mathematics*, 115(8), pp.392–403. [Online] Available at: https://doi.org/10.1111/ssm.12146 (Accessed: 15 February 2021).

Llinares, S. and Krainer, K. (2006) 'Mathematics (Student) Teachers and Teacher Educators as Learners', in Gutierrez, A. and Boero, P. (eds*.) Handbook of research on the psychology of mathematics education.* Rotterdam: Sense Publishers, pp.429–460.

Maehr, M. and Meyer, H. (1997) 'Understanding Motivation and Schooling: Where We've Been, Where we are, and Where We Need to Go', *Educational Psychology Review*, 9(4), pp.371–409. [Online] Available at: https://deepblue.lib.umich.edu/bitstream/handle/2027.42/44456/10648_2004_Article_414425.pdf%3Bjsessionid%3DC41DDA680AC9C8EA669E94604E28CC98?sequence%3D1 (Accessed: 05 September 2020).

Muijs, D. and Reynolds, D. (2015) 'Teachers' Beliefs and Behaviors: What Really Matters?', *Journal of Classroom Interaction,* 50(1), pp.25–40. [Online] Available at: https://files.eric.ed.gov/fulltext/EJ1100408.pdf (Accessed: 15 February 2021).

Murray, A., McCrory, C., Thornton, M., Williams, J., Quail, A., Swords, L., Doyle, E. and Harris. E. (2010) *Growing up in Ireland: Design, Instrumentation and Procedures for the Child Cohort*. [Online] Available at: https://www.growingup.ie/pubs/BKMNEXT255.pdf (Accessed: 5 April 2021).

National Council for Curriculum and Assessment (NCCA) (2014) *Mathematics in Early Childhood and Primary Education (3–8 years), Teaching and Learning.* [Online] Available at: https://ncca.ie/media/2147/ncca_research_report_18.pdf (Accessed: 04 October 2020).

National Council for Curriculum and Assessment (NCCA) (no date) *Mathematics: Guidelines for Teachers of Students with MILD General Learning Disabilities*. [Online] Available at: https://ncca.ie/media/3884/p_mild_maths-1.pdf (Accessed: 04 October 2020).

National Council for Curriculum and Assessment (NCCA) (1999) *A Primary School Curriculum: Mathematics.* Dublin: Stationary Office.

National Council for Curriculum and Assessment (NCCA) (2019) *Primary Developments: Final Report on the Coding in Primary Schools Initiative*. [Online] Available at: https://ncca.ie/media/4155/primary-coding_final-report-on-the-coding-in-primary-schools-initiative.pdf (Accessed: 18 February 2021).

Niemiec, C. and Ryan, R. (2009) 'Autonomy, Competence, and Relatedness in the Classroom. Applying Self-determination Theory to Educational Practice', *Theory and Research in Education*, 7(2), pp.133–144. [Online] Available at: https://journals.sagepub.com/doi/pdf/10.1177/1477878509104318 (Accessed: 01 October 2020).

Professional Development Service for Teachers (PDST) (2020) *Online Resources*. Available at: https://www.pdst.ie/node/3020 (Accessed: 04 October 2020).

Professional Development Service for Teachers (PDST) (2013) *Practical Approaches to Developing Mental Maths Strategies for Addition and Subtraction*. [Online] Available at: https://pdst.ie/sites/default/files/Mental%20Maths%20Workshop%201%20Handbook.pdf (Accessed: 04 October 2020).

Reeve. J. (2009) 'Why Teachers Adopt a Controlling Motivating Style Toward Students and How They Can Become More Autonomy Supportive', *Educational Psychologist*, 44(3), pp.159–175. [Online] Available at: https://doi.org/10.1080/00461520903028990 (Accessed: 30 September 2020).

Ryan, R. and Deci, E. (2000) 'Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions', *Contemporary Educational Psychology*, 25, pp.54–67. [Online] Available at: https://doi.org/10.1006/ceps.1999.1020 (Accessed: 11 September 2020).

Ryan, R. and Deci, E. (2020) 'Intrinsic and Extrinsic Motivation from a Self-Determination Theory Perspective: Definitions, Theory, Practices, and Future Directions', *Contemporary Educational Psychology.* [Online] Available at: https://selfdeterminationtheory.org/wp-content/uploads/2020/04/2020_RyanDeci_CEP_PrePrint.pdf (Accessed: 01 October 2020).

Ryan, R. and Deci, E. (2017) *Self-determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. New York: Guilford Publishing.

Sáez-López, J., Sevillano-García, M. and Vazquez-Cano, E. (2019) 'The Effect of Programming on Primary School Students' Mathematical and Scientific Understanding: Educational use of mBot', *Educational Technology Research & Development*, 67(6), pp.1405–1425. [Online] Available at: https://doi.org/10.1007/s11423-019-09648-5 (Accessed: 17 February 2021).

Upadyaya, K. and Eccles, J. (2014) 'How do Teachers' Beliefs Predict Children's Interest in Math from Kindergarten to Sixth Grade?', *Merrill-Palmer Quarterly*, 60(4), pp.403–430. [Online] Available at: https://acuresearchbank.acu.edu.au/download/d97835e476dc4d29883c29ddca74176bb512107bcf8d87dd6a90f12e08c5f3b6/475920/OA_Upadyaya_2014_How_do_teachers__beliefs_predict_children_s.pdf (Accessed: 01 October 2020).

Wang, S., Chang, S., Hwang, G. and Chen, P. (2018) 'A Microworld-based Role-playing Game Development Approach to Engaging Students in Interactive, Enjoyable, and Effective Mathematics Learning', *Interactive Learning Environments*, 26(3), pp.411–423. [Online] Available at: https://www.tandfonline.com/doi/pdf/10.1080/10494820.2017.1337038?needAccess=true (Accessed: 17 February 2021).

Whittemore, R. and Knafl, K. (2005) 'The Integrative Review: Updated Methodology', *Journal of Advanced Nursing,* 52(5), pp.546–553. [Online] Available at: https://pubmed.ncbi.nlm.nih.gov/16268861/ (Accessed: 29 December 2020).

An Examination of the Delivery of Wellbeing to the Primary School Child Through SPHE and PE

Maria Doyle

Biography

Maria Doyle was a qualified Chartered Accountant with PricewaterhouseCoopers (PwC) and worked in several diverse companies both in Ireland and the UK before taking up the role of Finance Manager with a charitable organisation for people with disabilities. Graduating with First-Class Honours in the Professional Master of Education (PME) from Hibernia College in 2021, Maria has since completed her first year of teaching in a DEIS primary school in Wexford with Fifth and Sixth Class. She derives immense satisfaction from helping her students realise their potential throughout the year. Maria shares her passion for wellbeing and sport with her students. As a mother of three children, she was drawn to teaching because it presents challenges that require constant innovation and versatility.

An Examination of the Delivery of Wellbeing to the Primary School Child Through SPHE and PE by Maria Doyle

Research Supervisor: Dr Lucie Corcoran

Abstract

This thesis aimed to explore how wellbeing is delivered and facilitated to primary school children through the curriculum subjects SPHE and PE. Findings from the study revealed themes that included the expansive definition of wellbeing, various modes of delivery, the perceived low status of both subjects in schools, and the role of teachers and schools in promoting these subjects. The dissertation further examined the effectiveness of programmes used in schools and unveiled the challenges associated with evaluating evidence of effectiveness. The study concluded that schools play a vital role in promoting wellbeing and that in narrowing the definition of such and providing more explicit measurable outcomes, the delivery of wellbeing to primary school children could be enhanced.

Keywords: Wellbeing, primary school, SPHE, PE

Introduction and Background

Wellbeing is a nebulous term. It is multi-faceted in that it means different things to different people. Barry and Friedli (2008) and DES (2019) best describe it as referring to the emotional, psychological, social, physical and spiritual wellbeing or the holistic person as a whole. Indeed, the pursuit of wellbeing and 'lifestyle spirituality' is often seen as a contemporary replacement for religion (Sheldrake, 2007). The World Health Organization (WHO) defines wellbeing as possessing good mental health or a 'state of wellbeing in which the individual realises his or her abilities, copes with the normal stresses of life, works productively and fruitfully, and makes a contribution to his or her community' (WHO, 2001, cited in Barry and Friedli, 2008, p.1). It is therefore evident that wellbeing is complex. Unsurprisingly, defining wellbeing and focusing on good mental health and, conversely, lack thereof are not the only ways of improving wellbeing. Skidmore (2020, p.23) espouses the view of psychologist theorist Martin Seligman in stating that the appreciation of 'what is right about mental health and ultimately, how to flourish' is pivotal to increasing wellbeing. Consequently, promoting competencies such as growth mindsets, coping strategies, problem-solving, social awareness and emotional literacy all form part of this complexity. Education can contribute to spaces that offer opportunities to develop these skills, which can and should be subsumed into school life (INTO, 2012; DES, 2019).

The *Education Act, 1998* refers to schools as being legally charged to support students' moral, spiritual, social and personal development along with providing health education for them in partnership with their parents (Ireland, 1998, p.13). Prior to 1999, health education was included as part of the PE curriculum in primary schools; however,

delivery of the curriculum was informal and unstructured due to the lack of support, training and resources (Clarke, 2011). In 1999, the Primary School Curriculum introduced a new subject in line with the Education Act — Social, Personal and Health Education (SPHE) (NCCA, 1999b). One of the main objectives of the SPHE curriculum is to 'promote the personal development and well-being of the individual child' (NCCA, 1999, p.2). However, Ireland was lacking in comparison to European, British and international standards regarding mental health, safety and wellbeing at school level at this time. The United Kingdom, for instance, launched the National Healthy Schools Programme (NHSP) initiative in 1998, which added a new subject to their school curriculum: Personal, Social and Health Education (PSHE). To coincide with this, a Social and Emotional Aspects of Learning (SEAL) programme was implemented in 2005 in primary and secondary schools in the UK to provide a framework that targets mental health provision to students at preventative and reactive levels (Vostanis et al., 2013). While the SPHE curriculum was being introduced in Irish schools to promote wellbeing, it primarily focused on child safety, healthy living and child protection without specific reference to wellbeing learning outcomes until children reach the Third to Sixth Class curriculum (NCCA, 1999b, p.39, p.55).

The Department of Children and Youth Affairs' (2014, p.3) *Better outcomes, brighter futures: the national policy framework for children and young people* espouses the view that 'investment in children is not only a social responsibility, it makes good economic sense'. Given the growing recognition that education can make a valuable contribution to improving children's wellbeing, it is understandable why a number of schools have invested in classroom-based programmes such as 'Friends for Life' and 'Weaving Well-Being' to work in parallel with the curriculum. It is noteworthy that a meta-analysis of school-based social and emotional learning programmes has shown positive improvements in children's emotional skills, attitudes, behaviour and learning experiences (Durlak et al., 2011). Likewise, 'Friends for Life' has been endorsed by the WHO as an effective programme to combat childhood anxiety issues (Higgins and O'Sullivan, 2015). The researcher has reviewed aspects of the *Well-being in primary schools guidelines for health promotion* (DES, 2015) and *Resources for promoting well-being in primary schools* (NEPS, 2015). A number of 'evidence-based intervention programmes that promote well-being' were identified in the resources, including 'Friends Programmes', 'Zippy Friends' and 'Incredible Years' (NEPS, 2015, p.6). Although there is no obligation on schools to invest in specific external programmes, many do. Many schools rely on general approaches and strategies to promote wellbeing. Although there are varying definitions, there is undoubtedly merit in promoting wellbeing to the primary school child. This initial investigation resulted in the following research questions:

1. How is wellbeing explicitly being explored through the SPHE/PE Curriculum?
2. What is the evidence of effectiveness of SPHE/PE in supporting wellbeing?
3. What can be done to improve the delivery of SPHE/PSHE/PE?

Methodology

The aim of this study was to gain a clearer understanding of the effectiveness of SPHE and PE in supporting the wellbeing of the primary school child. To this end, the researcher must decide on the appropriate paradigm to best inform the research project. Cooper (1998, cited in Russell, 2005, p.4) outlines five stages when conducting an

Integrative Literature Review (ILR). These include: problem formulation, data collection or literature search, evaluation of data, data analysis, and interpretation and presentation of results. The first phase — the problem identification stage — involves a clear identification of the problem and the purpose for addressing this in the project (Whittemore and Knafl, 2005, p.548). Following this, the literature search stage and the evaluation of data involve a comprehensive search of the literature using a specific focus or keywords. Throughout this phase, detailed attention and insight are demanded in identifying patterns and conflicts in data to address the effectiveness of SPHE and PE in supporting the wellbeing of the primary school child. Finally, the data is analysed and interpreted using data collection tools to allow the researcher to consolidate the various data evidence gathered into a 'unified statement about the research question' (Russell, 2005, p.5).

Integrative Literature Review (ILR)

The ILR process began with deciding on a topic of interest for review that personally motivated the researcher. Following an initial scoping exercise on the topic of wellbeing, a number of ideas were discussed with a supervisor. Work subsequently commenced on exploratory reading and a process of reflection on articles and books relevant to the phenomenon of wellbeing and how it is incorporated into the primary school classroom. Given the broad definition of wellbeing, the focus of the study was subsequently tapered to make the project feasible. This resulted in the selection of two primary school curriculum subjects — PE and SPHE — as parameters to be included in the evaluation process. The narrowing of the search, engagement in critical reflection and consultation with my supervisor resulted in the creation of specific research questions. Following the initial scoping exercise and exploratory reading phase, a number of terms were chosen as necessary to the literature search — wellbeing, primary school child, SPHE, PSHE, and Physical Education. These search terms were applied using Boolean logic in the Hibernia College library in the following databases: EBSCO: Academic Search Complete, ERIC, Education Source, and Taylor and Francis. One of the parameters set in the search included the criteria that the article had to be peer-reviewed and published in the last ten years, i.e. 2010 to 2020. To reach a manageable number of criteria for initial screening, the study had to be refined significantly, so rather than looking at wellbeing, the researcher looked specifically at the primary school curricular subjects PE and SPHE/PSHE.

Having identified the selected papers (Table 2), the researcher compiled an Excel document, which outlined the important elements of each of the 12 articles, including: the purpose of the study, the participants, methodology and methods employed, details on sampling, and a summary of the discussions and findings. With the research questions central to the researcher's mind, the selected documents were read a number of times to ensure thorough familiarisation. Subsequently, the process of thematic analysis ensued, using Braun and Clarke's (2006) model. This process involved the formulation of ideas and codes and the organisation of these ideas into themes using colour codes. The themes were then critically reviewed in relation to the evidence they produced in the context of the research questions under review.

Findings and Discussion

The analysis of selected literature uncovered practices associated with the implementation of SPHE/PSHE and PE that relate to the effectiveness on student

academic performance, anxiety levels, self-esteem, and social and personal skills development. The process also revealed how evaluations of effectiveness were carried out and the challenges associated with relying on stand-alone data in terms of validating such effectiveness. In addressing the research questions, five predominant themes, along with their identifier codes, emerged from the findings (Table 3). Each of these themes were critically discussed in the context of the selected papers (Table 2).

Table 2: Summary of Selected Papers

	Authors	Purpose	Sample	Methodology	Findings
1	Collins (2013)	Explore Circle Time (CT) as a mode of delivery of SPHE in Irish primary school classrooms. Identify what is actually happening during CT, i.e. rules, processes, aims and benefits.	Five Irish primary school classrooms. Main informants were the teachers (five in all) and observations of the children in the classroom (Senior Infants–Sixth Class)	Qualitative research Observations of CT in practice, analysis of five teacher journals, and pre- and post-observation interviews	Findings highlight the differences in rules regarding confidentiality and students refusing to speak amongst teachers. No evidence of children being invited to state problems. There was more emphasis on personal and skills development as opposed to self-esteem or emotional intelligence. Assessment and evaluation of the benefits of CT proved problematic.
2	Collins and Kavanagh (2015)	Explore student teachers' prior experience of CT at primary and post-primary school and how this will impact on their future use of the method in their own teaching practice in SPHE.	200 students engaged in teacher education course were surveyed — response rate was 50%. Poor response to focus group interviews resulted in one semi-structured interview with two students.	Mixed methods Self-administered questionnaires Semi-structured interview with two students who had agreed to partake in focus group	Teachers dominate theme selection for CT time. CT can marginalise less-confident pupils and infringe on privacy rights. Facilitation of student voice was most enjoyable part — hearing other people's thoughts. No respondents mentioned self-esteem, and confidence was only mentioned twice — once in a positive context and once in a negative context. Respondents reported having more negative experiences than positive experiences in their prior experience, specifically around the issues of confidentiality and ridicule.

3	Brown, Busfield, O'Shea and Sibthorpe (2011)	Examination of how PSHE is perceived and delivered, with particular emphasis on school ethos, participation and evaluation	London borough identified as having demonstrated good practice in PSHE. No specific numbers of participants given in article; however, one-quarter of primary schools invited to take part responded; just under one-half of secondary schools responded; and one-half in the 'other' category, which includes special schools, pupil referral units and a children's centre	Mixed methods Quantitative (online survey) and qualitative methods (10 in-depth interviews with PSHE coordinators) Focus groups (exact numbers not mentioned) to gather views of pupils included sixth-form pupils and two focus groups with primary school children — one with seven Year Two children and another with six Year Six children	Findings point to the role school ethos plays in supporting PSHE. Nearly 50% of co-ordinators had a certificate in PSHE teaching. Pupils' active involvement in decision making and effective relationships between school community were supported by PSHE. Participation of pupils and parents alike was a central aspect of PSHE delivery. Evaluation had been recorded in conversations/examples of work; however, over half had no formal means of evaluation.
4	Skryabina, Taylor and Stallard (2016)	Effects of anxiety prevention programme (FRIENDS) on children's academic performance, as assessed by national standardised attainment tests (SATs) in reading, writing and maths	1,362 children from 40 primary schools in England	Quantitative methods — Randomised Controlled Trial. Data was collected from the PACES study.	Anxiety prevention programme (FRIENDS) had no impact on children's academic performance regardless of gender/ethnicity, etc. Reduction in social/general anxiety occurred but only when FRIENDS was delivered by health leaders external to school. This seems to contradict Durlak (2011) and Barrett and Turner (2001).
5	Grillich, Kien, Takuya, Weber and Gartlehner (2016)	Evaluation of the effects of a health promotion programme (Classes in Motion) in primary schools	53 school classes from 45 primary schools in Lower Austria	Quantitative methods — Randomised Controlled Trial	Despite small, statistically significant differences in motor skills, the health promotion programme showed no evidence of effectiveness on school experience, physical activity, well-being and attention performance in primary school children.

6	Willis, Clague and Coldwell (2013)	Exploration of the perceived effectiveness of personal, social, health and economic (PSHE) in primary and secondary schools	1,540 English primary and secondary schools 9 primary schools and 5 secondary schools — 248 individuals	Mixed methods — surveys of 1,540 English primary and secondary schools; interviews and case study visits to primary and secondary schools, including parents and pupils	Status of PSHE is higher in primary schools. Personal wellbeing elements of PSHE were considered very effective. PSHE has close links to Social and Emotional Aspects of Learning (SEAL) programme. Teaching elements of PSHE curriculum not covered by programme were described as weak. There are differing views on the purpose of PSHE. Suggestion to 'unearth evidence of the impacts of effective PSHE on wider curriculum'.
7	Usher, Keegan and Edwards (2016)	Determining if there are appropriate, structured Physical Activity (PA) levels undertaken and implemented by PE teachers. Identifying the impact PA levels have on students' social and emotional well-being	10 primary schools. Three participant groups, including: (1) school-aged children (grades 1–5 [physical activity observational — n=30, survey — n=80]); (2) specialist PE teachers (survey — n=10); and (3) principals (survey — n=10)	Mixed methods Qualitative data from students, specialist PE teachers and principals Quantitative data on students' PA levels	75% of students responded they always liked PE. Frequency of activity, which can be classified as moderate/vigorous, decreased to a lower level after the first observation. Students were doing low-level PA when compared to vigorous actions. Lessons were more knowledge/management focused than fitness activity. PE was a favourite subject of students.
8	Kuyken et al. (2017)	Evaluate the effectiveness and cost-effectiveness of a mindfulness training programme in schools compared with normal school provision	76 schools in cluster and 5,700 school students aged 12–14 years	Quantitative methods — Randomised Controlled Trial. This is still at trial stage.	Findings are inconclusive at this stage but will aim to answer the question 'Can a universal school-based intervention such as Mindfulness Training (MT), shift the population away from mental ill-health and towards mental health and well-being?' A prototype of a school-based MT programme has been developed and piloted. Provisional evidence from the nonrandomised feasibility trial is encouraging. This study is mainly descriptive; however, the protocol has been informed by learning from two feasibility studies.

9	Formby (2011)	Exploration of PSHE delivery models and curriculum coverage. Evaluation of Pupil views on their experiences and (potential value) of PSHE	923 primary school PSHE education leads, involving 9 primary schools	Mixed methods — survey of 923 primary school PSHE leads and in-depth interviews and discussions with 171 participants	PSHE most likely covered within SEAL and is limited to a maximum of 1 hour per week discrete lessons. Health and wellbeing focus in 75% of lessons often taught through 'carpet' time/CT. Teaching methods — use of external providers uncommon. Pupil voice — pupils were positive about the subject. Lessons more interactive than more traditional lessons. Learning about puberty had personal impact for children. This contrasted with teachers' views that this was an embarrassing part of PSHE.
10	Fitzpatrick, Twohig and Morgan (2014)	An exploration of priorities for primary education, ranging from subjects to life skills and children's social and emotional development	960 responses from a combination of parents, primary teachers, principals and early childhood practitioners.	Qualitative research — NCCA issued an invitation in the form of an online survey, and the Uniform Resources Locator (URL) was circulated to members of NCCA, primary teachers, parents, principals and early childhood practitioners. Respondents were asked to complete an open text box specifying their purpose/priority for primary education in 100 words or less.	Findings indicated that six priorities for primary education were identified. Wellbeing and supporting children to flourish underpin all six priorities. There is something of a discrepancy between the high ranking for elements of SPHE and low ranking for the subject. Similarities in curriculum developments/shared ambitions in all sectors — early childhood, Junior/Senior Cycle — highlighted.

11	Murphy and McEvoy (2020)	Investigation of the personal PE experiences at both primary and post-primary level of a cohort of Irish primary school teachers. Exploration of their understanding of the nature and purpose of physical education and their teaching of it	25 primary teachers (16 female/9 male) who had been teaching PE for between 27 to 41 years	Qualitative approach — each participating teacher took part in a semi-structured interview.	Findings include reporting the low status of PE in schools. 3 participants in the study reported having PE in primary school, 19 reported having PE in post-primary, 2 reported not recalling being taught PE and one participant gave no answer. No formally organised structure of PE. Games/drill dominated. Little reference to learning in and through physical education or wide range of opportunities for children. One participant noted it was a great way of engaging boys. PE synonymous with break time. PE is now an examinable subject counting towards higher education. Teachers highlighted the benefit of 'movement' and how this contributes to 'a healthy mind and a healthy body' and how an awareness of the body, movement and the enjoyment of that contributes to 'well-being'.
12	Coulter, McGrane and Woods (2020)	Exploration of parents' and children's attitudes toward their school's physical education provision	One large suburban mixed primary school with 780 pupils	Quantitative study — A 37-item questionnaire with 33 closed and 4 open-ended questions. Parents completed the questionnaire with the eldest child in each family. Children's responses were recorded by parents in consultation with their child.	Findings indicated that PE is the most enjoyable school subject and involves 'fun'. No feeling to excel in PE in order to enjoy it. Boys and girls would choose to do it. Dance rarely taught. Children felt not enough time given to PE. Parents valued health and fitness, fun and enjoyment, and teamwork of PE. Parents did not know what their child was learning in PE. No study done on lesson content.

Table 3: Findings from Thematic Analysis Including Identifier Codes

Themes	**Theme 1** Modes of Delivery	**Theme 2** Evaluation	**Theme 3** Student Voice	**Theme 4** Status of Subject	**Theme 5** Whole School Approach
Identifier Codes	Privacy Confidentiality Inclusiveness Active Participation Health promotion Anxiety prevention Mindfulness CT/SEAL	Evidence used — SATS/Fitness The need to validate Formal/informal Validation of programmes	Facilitation of voice Children's interest Positivity re subjects What do children want?	Poor status of two subjects Parental involvement SEAL and PSHE Curriculum development	Teacher role Dedicated PSHE co-ordinators Learning experiences

Modes of Delivery

Six of the studies reviewed examined circle time, health promotion, the anxiety prevention programme 'FRIENDS', and mindfulness as a means of promoting wellbeing to children through SPHE and PE. While circle time was widely used in both the implementation of SPHE in Ireland and PSHE in the UK, Collins and Kavanagh (2015, pp.1817–18) note the benefits of such practices are often overshadowed by the ostracism of 'less confident students', with some students admitting to 'exacerbated feelings of self-consciousness' during sessions. Moreover, there was very little evidence of children being invited to 'share problems', and there was an uncertainty surrounding confidentiality along with the right to refuse to speak, resulting in Collins and Kavanagh (2015) stating that circle time produced 'more negative experiences than positive' for some students (p.1819). The issue of theme selection and the lack of opportunity to contribute to such selection is also noteworthy. Surprisingly too, no participants reported enhancement of self-esteem or confidence during the same study. It is interesting to note, however, that student teachers confirmed they would still use circle time in future as part of their teaching (Collins and Kavanagh, 2015, p.18110). It is evident that student teachers want to explore this methodology further and are open to undertaking measures to ensure circle time 'promotes rather than undermines participants' a sense of inclusion (Collins and Kavanagh, 2015, p.18110).

In addition to circle time, health promotion and anxiety prevention were examined as part of the curriculum delivery of PE and SPHE. Literature previously reviewed on the FRIENDS programme, 'Zippy Friends', Weaving Well-Being and Incredible Years implied

that these programmes work well in supplementing the curriculum; however, the analysis of the selected papers (Table 2) demonstrates reductions in anxiety only occurred when programmes were delivered by health care leaders external to the school as opposed to teachers (Skryabina, Taylor and Stallard, 2016). Similarly, studies on the impact of physical education and the introduction of the health promotion programme 'Classes in Motion' showed little evidence of effectiveness on children's wellbeing, even with highly motivated teachers. Lessons frequently lacked the 'intensity', 'frequency' and 'structure' required to ensure the successful delivery of health promotion (Grillich et al., 2016, p.7; Usher, Keegan and Edwards, 2016, p.12). The impact of Covid-19 on children's anxiety levels meant more teachers used mindfulness techniques to help try alleviate the problem. Mindfulness practices involve directing our thoughts and consciousness away from 'negative patterns of thinking and behaviour' (Kuyken et al., 2017, p.3). Positively, the literature on mindfulness included in this review, while still at trial stage, is at an advanced stage of establishing how mindfulness-based training can be an effective approach in shifting the agenda for young people from mental ill-health to mental wellbeing (Kuyken et al., 2017). Indeed, a prototype of the programme was piloted and the results have shown improvements in both students' and teachers' wellbeing (Kuyken et al., 2017), which included various modes of delivering wellbeing principles. Given the key outcome noted in the Skryabina, Taylor and Stallard RCT (2016) that the classroom-based FRIENDS programme was only effective in reducing children's anxiety when delivered by healthcare staff, it is likely schools will find it difficult to promote investment in this programme in the future.

Evaluation of Methods, Programmes and Subjects

The issue of assessment has been central to the research questions in this thesis. Indeed, the lack of evaluation evidence of Ireland's positive psychology programme Weaving Well-Being (Forman and Rock, 2017) has prompted this research. Economic issues such as the cost of PSHE Continuing Professional Development programmes, education in general and the ability to offer 'relatively low-cost' interventions have all been referred to in some shape or form in these papers, thus highlighting the explicit burden to substantiate results of investment in wellbeing (Brown et al., 2011; Kuyken et al., 2017). Arising from the findings of Willis, Clague and Coldwell (2013), Brown et al. (2011), Collins (2013) and Grillich et al. (2016) point to the need to demonstrate evidence on the impact of the effectiveness of PSHE/SPHE and PE in supporting teaching and learning across the curriculum.

Specific methods of subject evaluations in schools — teacher/pupil conversations, writing about subject aspects pupils enjoyed, showing examples of work to discuss, reflections and completion of questionnaires — have been extensively carried out, e.g. Brown et al. (2011), Collins (2013) and Coulter, McGrane and Woods (2020). However, only one-half of the schools surveyed in one study had any formal means of evaluating PSHE and authors described such method and subject evaluations as 'problematic' and difficult (Brown et al., 2011; Collins, 2013, p.430; Formby, 2011).

Statistical analyses of academic results in reading, writing and maths, anxiety, wellbeing and fitness levels were used as an alternative means of carrying out evaluations of the effectiveness of programmes designed to support the curriculum (Skryabina, Taylor and Stallard, 2016; Usher, Keegan and Edwards, 2016; Grillich et al., 2016). Notably, teachers asserted that SPHE should not be assessed and suggested the 'long-term

nature of aims' make evaluations challenging (Collins, 2013, p.423). Students' views on the effectiveness of both subjects contributed to the overall discussion of evaluation and highlighted a diversity in priorities. While some authors (Brown et al., 2011; Skryabina, Taylor and Stallard, 2016; Grillich et al., 2016) referred to the need to justify curriculum content in terms of cost effectiveness and results on academic performance, students themselves emphasised the importance of learning about things that have an 'immediate personal impact on them' (Formby, 2011, p.168; Grillich et al., 2016). Furthermore, contrary to what was concluded regarding the FRIENDS programme's ability to improve academic performance (Durlak et al., 2011) the Skryabina, Taylor and Stallard (2016) RCT study of the FRIENDS programme failed to identify any additional effects on children's academic performance. Moreover, this study appears to contradict the study of Barrett and Turner (2001) in implying the teacher's use of this programme does not result in the successful reduction of anxiety levels in students (Skryabina, Taylor and Stallard, 2016).

The issue of evidence or lack thereof of effectiveness was of particular interest. Grillich et al. (2016, p.6) explained, 'It is important to distinguish between good evidence of ineffectiveness and failure to demonstrate underlying effectiveness'. In other words, just because we cannot find a measured outcome from a programme does not automatically mean there is none. Anecdotal evidence, for instance, from teachers, parents and pupils in these selected papers (Table 2) illustrate how PE and SPHE have a positive impact on pupils' 'holistic development', behaviour and attitudes, both inside and outside the school (Brown et al., 2011; Murphy and McEvoy, 2020, p.1330). Furthermore, the findings in these papers suggest benefits that include: learning life skills, making children 'aware of other people', and providing opportunities to learn through the 'medium of movement' — that which should not be dismissed due to a failure to demonstrate underlying effectiveness (Brown et al., 2011, p.127; Murphy and McEvoy, 2020, p.1330).

Student and Parent Voice

Facilitation of student voice in the delivery of PE/SPHE lessons, theme selection during circle time, and offering students the opportunity to learn about real-life situations has permeated a number of selected studies in this review (Formby, 2011; Collins, 2013; Collins and Kavanagh, 2015; Murphy and McEvoy, 2020). Findings from Formby (2011), Collins and Kavanagh (2015, p.1818) and Usher, Keegan and Edwards (2016) note how students enjoyed the break from the intensity of academic subjects afforded to them by SPHE/PSHE. Perhaps one of the most disappointing findings relates to the lack of emphasis on the development of the student voice, citizenship and democratic skills during SPHE implementation (Collins, 2013).

Children's views of PE as 'their favourite subject' or the 'most enjoyable' school subject that they 'always liked' featured in Usher, Keegan and Edwards (2016); Coulter, McGrane and Woods (2020); and Murphy and McEvoy (2020). Notwithstanding the fact that health and fitness promotion was found to be the most significant skill and activity associated with PE, parents and students both commented that it was the 'fun and enjoyment' components that were considered the most important attitude and value placed on children's physical education (Coulter, McGrane and Woods, 2020, p.437). Unfortunately, the implication of teacher usage of PE as a subject to wield 'punishment for minor infringements in class' or a 'treat' for good behaviour or a 'good way of getting

through to boys' was also featured in Coulter, McGrane and Woods (2020, p.435) and Murphy and McEvoy (2020, p.1331).

Status of Subjects

Despite helping children to be well physically and psychologically, one study found that in all six priorities of children's primary education, the status of PE and SPHE as curriculum subjects has been found to be 'low' by several authors (Formby, 2011; FitzPatrick, Twohig and Morgan, 2014, p.282; Usher, Keegan and Edwards, 2016; Murphy and McEvoy, 2020). Willis, Clague and Coldwell (2013) assert that the status of PSHE appears to be higher in primary schools than secondary schools. However, teachers' perceptions of PSHE as a subject they would value less 'highly than other curriculum subjects' is noteworthy (Brown et al., 2011, p.124). In relation to PE, some authors discovered a lack of 'organised structure' (Murphy and McEvoy, 2020, p.1329) and low levels of physical activity during lessons coupled with little evidence of lesson content, engagement or learning skills in teamwork or sportsmanship (Usher, Keegan and Edwards, 2016; Coulter, McGrane and Woods, 2020; Murphy and McEvoy, 2020, p.1329).

The blurred lines between SEAL and PSHE is also a feature whereby authors identify the dominance of SEAL delivery at the expense of other aspects of PSHE such as Drugs, Alcohol and Tobacco (DAT), Sexuality and Relationships Education (SRE) or Economics education (Formby, 2011; Brown et al., 2011; Willis, Clague and Coldwell, 2013). The weak coverage of other features of PSHE has implications for students' lives, with student interviewees noting in one paper that they were 'bored' of SEAL or learning about bullying and outlining how eager they were to learn about subjects such as sexuality and relationships instead (Formby, 2011, p.165). It is evident that the topic of wellbeing has considerable breadth, and these chosen papers focus on a wide variety of learning outcomes — not just psychological wellbeing but also academic performance, personal fitness, resilience, and nurturing children's sense of identity and belonging, enjoyment and fun. As a result, the researcher particularly notes these two subjects are everything and yet nothing, a combination of aspirations and approaches without the scaffolding of time, concrete resources or conditions to meet all these endeavours.

Whole School Approach/Teacher Role

The value a school places on PE and SPHE/PSHE plays a pivotal role in the curriculum implementation process. While some authors noted a thriving PSHE teachers' network within some schools, including the role of specific PSHE co-ordinators, senior leadership support for PSHE and Continuing Professional Development, other schools appeared to have a disregard for PSHE with one author noting that some teachers felt 'abandoned' and 'exhausted' by the lack of seriousness taken by other members of staff (Brown et al., 2011, p.125; Willis, Clague and Coldwell, 2013). Learning experiences in PE also differed, with variances in teachers' concepts of understanding of physical education, fitness activities and the overall 'learning in and through physical education' that can take place (Usher, Keegan and Edwards, 2016; Murphy and McEvoy, 2020).

Teachers play an important role in the process of promoting subjects and methodologies within the classroom. In some case, authors noted 'teachers' enjoyment of sessions' in circle time and the potential for mindfulness training to improve teachers' personal 'self-efficacy and wellbeing' (Collins, 2013, p.430; Kuyken et al., 2017). The issue of

motivation arises here along with the role of generalist primary teachers in promoting all curricular subjects regardless of whether they like them or not. Embedded in this motivation, one selected author explains, is a 'breadth of influences' such as the teacher's own personal sporting history, family influence and the teacher's own actual experience of teaching PE at primary level (Murphy and McEvoy, 2020, p.1332). Frequently, PE is considered akin to 'informal breaktime'; however, the elevation of the subject as an examinable subject counting towards entry points to third level coupled with the development of a new physical education curriculum is significant (Murphy and McEvoy, 2020, p.1333). Significantly, however, parents admitted to being unaware of what activities their children were involved in and what their children were learning during PE (Coulter, McGrane and Woods, 2020).

Conclusion

In conclusion, the thesis endeavoured to critically examine wellbeing through the SPHE/PE curriculum and reveals the evidence or, conversely, the lack thereof in effectiveness of SPHE/PE in supporting wellbeing. Where possible, this discussion has included relevant reference to the Irish context. It is hoped that by embracing concrete, practical approaches and methodologies, efforts to promote wellbeing will be enhanced. However, for wellbeing to be successful, curriculum authors must clearly define wellbeing learning outcomes in SPHE and PE and bring a sense of practicality to the delivery of wellbeing at all primary school levels.

References

Barry, M.M. and Friedli, L. (2008) 'The Influence of Social, Demographic and Physical Factors on Positive Mental Health in Children, Adults and Older People', *Foresight Mental Capital and Wellbeing Project. State-of-Science Review: SR-B3*. London UK: Government Office of Science and Innovation, pp.1–23.

Braun, V. and Clarke, V. (2006) 'Using Thematic Analysis in Psychology*', Qualitative Research in Psychology*, 3(2), pp.77–101.

Brown, J., Busfield, R., O'Shea, A. and Sibthorpe, J. (2011) 'School Ethos and Personal, Social and Health Education', *Pastoral Care in Education*, 29(2), pp.117–131.

Clarke, A.M. (2011) *An Evaluation of Zippy's Friends, An Emotional Wellbeing Programme for Children in Primary Schools*. PhD thesis. National University of Ireland Galway. [Online] Available at: https://zippysvenner.dk/media/53487/thesis_aleisha-clarke.pdf (Accessed: 06 August 2020).

Collins, B. (2013) 'Empowerment of Children through Circle Time: Myth or Reality?', *Irish Educational Studies*, 32(4), pp.421–436.

Collins, B. and Kavanagh, A. (2015) 'Circle Time as an Inclusive Learning Space: Exploring Student Teacher's Prior School Experiences', *All Ireland Journal of Teaching and Learning in Higher Education*, 7(2), pp.1811–18115.

Coulter, M., McGrane, B. and Woods, C. (2020) '"PE Should Be An Integral Part of Each School Day": Parents' and Their Children's Attitudes Towards Primary Physical Education', *Education 3-13*, 48(4), pp.429–445.

Department of Education and Skills (2019) *Wellbeing Policy Statement and Framework 2018-2023*. [Online] Available at: https://assets.gov.ie/24725/07cc07626f6a426eb6eab4c523fb2ee2.pdf (Accessed: 04 August 2020).

Department of Children and Youth Affairs (DCYA) (2014) *Better Outcomes, Brighter Futures.* [Online] Available at: https://www.gov.ie/en/publication/775847-better-outcomes-brighter-futures/ (Accessed: 6 August 2020).

Durlak, J.A., Weissberg, R.P., Dymnicki, A.B., Taylor, R.D. and Schellinger, K.B. (2011) 'The Impact of Enhancing Students' Social and Emotional Learning: A Meta-analysis of School-based Universal Interventions', *Child Development,* 82(1)*,* pp.405–432*.*

FitzPatrick, S., Twohig, M. and Morgan, M. (2014) 'Priorities for Primary Education? From Subjects to Life-skills and Children's Social and Emotional Development', *Irish Educational Studies*, 33(3), pp.269–286.

Forman, F. and Rock, M. (2017) *Weaving Well-Being*. Available at: http://weavingwellbeing.com/ (Accessed: 27 February 2020).

Formby, E. (2011) '"It's Better to Learn about Your Health and Things That Are Going to Happen to You Than Learning Things That You Just Do at School": Findings from A Mapping Study of PSHE Education in Primary Schools in England', *Pastoral Care in Education*, 29(3), pp.161–173.

Higgins, E. and O'Sullivan, S. (2015) 'What Works: Systematic Review of the Friends for Life Programme as a Universal School-based Intervention Programme for the Prevention of Child and Youth Anxiety', *Educational Psychology in Practice,* 31(4), pp.424–438*.*

Irish National Teacher's Organisation (2012) *Wellbeing in the Classroom: Discussion Document and Proceedings of the Consultative Conference on Education 2012*. [Online] Available at: https://www.into.ie/app/uploads/2019/07/Wellbeing_Classroom.pdf (Accessed: 04 August 2020).

Kuyken, W., Nuthall, E., Byford, S., Crane, C., Dalgleish, T., Ford, T., Greenberg, M., Ukoumunne, O., Viner, R. and Williams, J. (2017) 'The Effectiveness and Cost-Effectiveness of a Mindfulness Training Programme in Schools Compared with Normal School Provision (MYRIAD): Study Protocol for a Randomised Controlled Trial', *Trials*, 18, pp.1–17.

Murphy, F. and McEvoy, E. (2020) 'Listening to the Voices of Teachers: Primary Physical Education in Ireland', *Sport in Society*, 23(8), pp.1320–1336.

National Council for Curriculum and Assessment (NCCA) (1999a) *Primary School Curriculum: Introduction*. [Online] Available at: https://www.curriculumonline.ie/getmedia/c4a88a62-7818-4bb2-bb18-4c4ad37bc255/PSEC_Introduction-to-Primary-Curriculum_Eng.pdf (Accessed: 6 August 2020).

National Council for Curriculum and Assessment (NCCA) (1999b) *Primary School Curriculum*: *Social, Personal and Health Education*. Dublin: The Stationery Office.

National Council for Curriculum and Assessment (NCCA) (1999c) *Primary School Curriculum: Physical Education*. Dublin: The Stationery Office.

Russell, C.L. (2005) 'An Overview of The Integrative Research Review', *Progress in Transplantation*, 15(1), pp.8–13. [Online] Available at: https://www.researchgate.net/publication/7898657_An_overview_of_the_integrative_research_review (Accessed: 18 August 2020).

Seligman, M. (2018) 'PERMA and The Building Blocks of Well-being', *The Journal of Positive Psychology*, 13(4), pp.333–335. [Online] Available at: https://doi.org/10.1080/17439760.2018.1437466 (Accessed: 01 April 2021).

Sheldrake, P. (2007) *A Brief History of Spirituality*. Oxford: Blackwell Publishing.

Skryabina, E., Taylor, G. and Stallard, P. (2016) 'Effect of a Universal Anxiety Prevention Programme (FRIENDS) on Children's Academic Performance: Results from a Randomised Controlled Trial', *Journal of Child Psychology and Psychiatry*, 57(11), pp.1297–1307.

Skidmore, B. (2020) 'Applications of Positive Psychology Toward Leadership in Early Childhood Education', *Exchange (19460406*), 251, pp.20–24. [Online] Available at: https://dcf.wisconsin.gov/files/ccic/pdf/articles/applications-of-positive-psychology-toward-leadership.pdf (Accessed: 8 May 2020).

Usher, W., Keegan, R. and Edwards, A. (2016) 'Taking the "Physical" Out of Physical Education', *Cogent Education*, 3(1), pp.1–15.

Vostanis, P., Humphrey, N., Fitzgerald, N., Deighton, J. and Wolpert, M. (2013) 'How do Schools Promote Emotional Well-being Among Their Pupils? Findings From a National Scoping Survey of Mental Health Provision in English Schools', *Child and Adolescent Mental Health*, 18(3), pp.151–157.

Whittemore, R. and Knafl, K. (2005) 'The Integrative Review: Updated Methodology', *Journal of Advanced Nursing*, 52(5), pp.546–553.

Willis, B., Clague, L. and Coldwell, M. (2013) 'Effective PSHE Education: Values, Purposes and Future Directions', *Pastoral Care in Education*, 31(2), pp.99–111.

'No One Size Fits All': Exploring the Impact of Inclusive Education on the Social Development of Children with Autism Spectrum Disorder (ASD) in Primary Schools, with Particular Attention to the Role of the Teacher

Lorna Fanthom

Biography

Lorna Fanthom graduated with a Bachelor of Arts (Hons) Degree in Geography and Philosophy from University College Dublin. Following this, she undertook the Professional Master of Education (PME) in Primary Education in Hibernia College and graduated with a Second-Class Honours in 2021. Lorna has since completed her NQT year where she taught Third Class and completed Droichead in a primary school in Co. Wicklow. She has always had a personal interest in ASD and has three cousins and an uncle who are all diagnosed with ASD. This familial experience, along with working with children diagnosed with ASD in a mainstream and ASD classroom, prompted her keen interest in the different types of provision within mainstream schools for children with ASD. Lorna is currently teaching Third Class.

'No One Size Fits All': Exploring the Impact of Inclusive Education on the Social Development of Children with Autism Spectrum Disorder (ASD) in Primary Schools, with Particular Attention to the Role of the Teacher, by Lorna Fanthom

Research Supervisor: Dr David Mulrooney

Abstract

The number of children with Autism Spectrum Disorder (ASD) in primary school classrooms is increasing. Special classrooms and mainstream classrooms are two types of learning environments that exist for children with ASD in an inclusive mainstream school. This study found that to provide the right learning environment for a child with ASD, there needs to be increased communication and collaboration amongst all stakeholders to identify and cater for the individualised learning needs of each child. A holistic approach and a diverse learning environment that is accepting of all children's individual needs and experiences are needed for a successful inclusive environment that would promote the social development of a child with ASD.

Keywords: Autism Spectrum Disorder; ASD; Inclusive education; Mainstream; Social development; Neurodiversity

Introduction and Background

ASD is one of the most common neurodevelopment disorders observed in children (Lindsay et al., 2013). Therefore, it is important to look at how children with ASD are included and catered for in mainstream education. To accomplish this, research was carried out on the characteristics of ASD, inclusive education, and the types of educational provision that exist in relation to ASD in an Irish Context.

ASD can be considered as a neurodevelopmental disorder characterised by deficits in social communication and involving restricted interests and repetitive behaviours (Ousley and Cermak, 2014; Christensen et al., 2020). This relates to the medical model, which focuses on normalisation and the causation and cure for autism (Kapp et al., 2013). Neurodiversity challenges this model, viewing autism as a celebratory way of being as inextricably 'inseparable aspect of identity' (Kapp et al., 2013, p.1). McWatters (2017) asserts that nature thrives when the development of many different types of people is fostered. Perceiving the learner and learning as a singular entity and process marginalises people who do not meet these criteria (McWatters, 2017) and subsequently presents society as one-dimensional and narrow-minded.

A deficit in social communication could mean the child may be lacking in social-emotional reciprocity and in nonverbal communicative behaviours needed for social interactions in developing, maintaining and understanding relationships. This lack of social communication can hinder learning, especially when learning requires social interaction or involves settings with peers (American Psychiatric Association, 2013). ASD is a spectrum disorder. This means that the manifestations of this disorder vary widely amongst children with ASD (Leonard and Smyth, 2020). There may be an insistence on

sameness or an inflexible adherence to routines, which may result in extreme distress with any small changes. Other symptoms of children with ASD may include highly restricted fixated interests or hyporeactivity to sensory input. A child with mild autism or 'high functioning' autism is more likely to communicate verbally and will require minimal support to function on a daily basis, whereas a child with severe autism may be non-verbal and will require very substantial support on a daily basis to learn skills important for everyday living (Gilmore, 2019).

Inclusion and Inclusive Education

There is a lack of consensus surrounding the definition of the term 'inclusion' and what 'inclusive education' should entail. Inclusion asserts the right for every child to be valued equally, irrespective of their sex, ability, religion, nationality or economic background. Inclusion strives to remove any barriers to education and involves the restructuring of a school as a whole (Stevens and O'Moore, 2009; UNESCO, 2019). Inclusion in education works to eliminate forms of discrimination in all learning spaces to espouse the view that 'every learner matters and matters equally' (UNESCO, 2017). Inclusive education seeks to transform the classroom to meet the needs of the child as opposed to the child adapting to the learning environment.

Educational Provision: Mainstream Class and Special Class

The 'no-one-size-fits-all' approach towards the inclusion of children with autism validates that learner needs are on a spectrum (Hornby, 2003). Goodall (2015) articulates the view that there are no clear learning outcomes as to whether segregated or non-segregated learning settings are more favourable towards educational achievement for pupils with ASD. Lal (2005) refers to inclusive education for children with ASD as a matter of positioning such pupils in a mainstream classroom to the extent appropriate to their needs. Anglim, Prendeville and Kinsella (2017) further argue that children with ASD should be enabled to progress academically and develop social and emotional skills within a mainstream classroom with their peers, where possible. Currently, there are different forms of educational provision for children with ASD in mainstream schools, including special classes, the allocation of 4.25 hours of resource teaching and early-intervention classes to name just a few. However, it is not clear whether such resources are sufficient to cater for the varied needs of children with ASD. There remains an uncertainty as to which types of provision work well in relation to the inclusion of children with ASD in mainstream schools. The initial readings on the ways in which mainstream schools include and cater for the diverse needs of children led to following research questions:

1. What impact does inclusive education have on the social development of children with ASD?
2. What role does a teacher play in supporting children with ASD?

Methodology

Methodologies used in social and educational research processes are informed by philosophical assumptions (Humphrey, 2013). These philosophical assumptions or sets of basic beliefs are known as paradigms (Guba and Lincoln, 1994). Within educational research, the chosen paradigm is used to represent the researcher's worldview (Kivunja

and Kuyini, 2017). Examples of paradigms that can be used within research projects are positivist, critical and interpretivist. The aim of this research is to grasp a deep understanding of a topic. The interpretivist approach was deemed most appropriate for the Integrative Literature Review (ILR). While this paradigm is qualitative in nature, it can incorporate both qualitative and quantitative studies. Both studies were utilised to support this research study. This ties in with the use of thematic analysis (TA) when examining papers, which is a qualitative method where the aim is to identify and interpret the key elements of the data (Clarke and Braun, 2017).

Documentary research was chosen for this study to provide insights into the different types of provision mainstream schools have for children with ASD. This method is a secondary source of data collection and analysis (Creswell, 2009; Morgan, 2014). It enables the researcher to analyse documents that contain information about the research topic and to gather multiple viewpoints and background knowledge (Ahmed, 2010). As part of documentary research, the researcher carefully selected documents, which were analysed, synthesised and evaluated.

Integrative Literature Review (ILR)

An integrative review is similar to a systematic review in that it is rigorous and transparent. However, unlike the systematic review, which focuses on experimental studies, the ILR allows for experimental and non-experimental studies to contribute to the research and provides a more holistic understanding of the research topic (Toronto and Remington, 2020). It synthesises information in empirical and theoretical sources. This approach allows for the use of diverse methods such as the processes of a non-experimental design, systematic approach and detailed search strategy in order to address the research question (Schick-Makaroff et al., 2016; Noble and Smith, 2018). This process aims to highlight issues that the research has left unresolved (Taveggia, 1974). This process involves five stages, which Cooper (1998) describes. These five stages involve a problem identification stage, a data collection or literature search stage, an evaluation of data stage, a data analysis stage, and the presentation stage (Whittemore and Knafl, 2005).

Data Analysis

Twelve articles were chosen to be analysed for this research study. Data analysis is where the 'separate data points are synthesized into a unified statement about the research problem' (Cooper, 1982, p.297). This research project summarised and synthesised academic literature using a form of TA. The table below incorporates a summary of the selected documents. This table includes the authors, the purpose of the study, the sample size, the methodological approach and a brief outline of findings.

Table 2: Summary of Selected Papers

	Author	Purpose	Sample	Methodology	Findings/Summary
1	Gledhill and Currie (2020)	Exploring teachers' perspectives on the use of social support for students with ASD	Two experienced primary teachers (female) from Sydney, Australia	Qualitative approach with a series of two semi-structured interviews	The findings highlight the significant and vital need for the use or social support for students with ASD.
2	Majoko (2015)	Identifying social barriers to and enablers of inclusion of six- to twelve-year-old children with ASD in mainstream, Zimbabwe classrooms	Twenty-one regular primary school teachers (nine males and twelve females) with a range of four to twenty years' teaching experience	Qualitative approach using in-depth semi-structured interviews	Social rejection, communication impairments and behavioural challenges of children with AD interfered with inclusion in mainstream classrooms.
3	Simpson and Bui (2016)	Examining the effects of a class-wide, peer-mediated shared reading intervention on the social interactions of K-2 students with LFA and their peers	Twelve second graders (aged seven or eight) and four K-2 students with LFA (aged between five and eight years old) in a Northern California elementary school	Qualitative approach using a peer-mediated shared reading intervention with observational recording	The findings show that peer-mediated shared reading interventions can be used to increase the social interactions of students with LFA.
4	Anglim, Prendeville and Kinsella (2018)	Eliciting lived experiences of primary school teachers about teaching children with ASD in mainstream and highlighting barriers and enablers to inclusive practices	Six Irish primary school teachers (all female) with five to ten years' teaching experience	Qualitative approach with semi-structured interviews	The findings show that ability, behaviour and equity in the classroom are challenges of including children with ASD. Benefits of including children with ASD are the development of caring friendships and peers learning acceptance and understanding.
5	Zazzi and Faragher (2018)	Exploring students' interpretations of 'visual clutter' in the classroom to seek to improve Educational Quality Of Life (EQOL)	Two students with ASD in year 4 and one student with SD in year 3 in a Brisbane primary school in Australia	Qualitative approach using photo elicitation, draw and talk, semi-structured interviews	'Visual clutter' needs to be understood from the personal interpretations of students as the student's voice is central to EQOL. Colour palette, feature congestion, affordances and spatial size need to be considered for a more inclusive and diverse learning environment.

6	Lindsay, Proulx, Thomson and Scott (2013)	Exploring teachers' challenges on creating an inclusive environment for children with ASD	Thirteen educators (ten females, three males) who have experience teaching children with ASD at elementary school level within two cities in Ontario, Canada	Qualitative approach with in-depth semi-structured interviews	Understanding and managing behaviour; socio-structural barriers (e.g. training, resources); and creating an inclusive environment within the classroom are challenges teachers face for catering for children with ASD. Resources, supports and training are needed to provide an inclusive environment for students with ASD.
7	Rotheram-Fuller, Kasari, Chamberlain and Locke (2010)	Comparing the differences between the social involvement of children with ASD and their peers at different grade levels	Seventy-nine children with AD and seventy-nine of their peers in seventy-five elementary classrooms (K-1 to fifth grade) across thirty schools in Los Angeles	Quantitative approach using social network (friendship) surveys	In inclusive classrooms, children with AD are only involved in peers' social relationships about half of the time, and appear even less connected with increasing grade level.
8	Leonard and Smyth (2020)	Identifying primary school teachers' attitudes towards the inclusion of children with ASD in mainstream education	Seventy-eight primary school teachers (twelve male, sixty-two female, four N/A) in primary schools with associated special education needs units, in the Republic of Ireland	Quantitative approach using an online survey on the platform Qualtrics	Teachers who believed they had the adequate resources to facilitate inclusion had significantly more positive attitudes than teachers who did not believe that they had the adequate resources to facilitate inclusion.
9	Finch, Watson, MacGregor and Precise (2013)	Exploring teachers' experiences concerning inclusion practices for children with ASD	Sixteen elementary education teachers from third, fourth and fifth grade, in a rural Southwest Missouri school district	Mixed-methods approach using a survey and two focus groups	The findings show that the teachers believe there is a shortage of preservice preparation and a need for increased collaboration, resources and training.
10	Reed, Osborne and Waddington (2012)	Examining the impact of school placement in mainstream or special settings on the behavioural functioning of children with ASD	Fifty-four children attending mainstream and forty-three children attending a special school in the UK diagnosed with ASD	Mixed-methods approach using interviews with the Gilliam Autism Rating Scale (GARS), Strengths and Difficulties Questionnaire (SDQ) and the Vineland Adaptive Behaviour Scale (VABS)	Children with ASD made improvements in both types of placement (mainstream and special). Children in special provisions, however, made greater improvements in areas of conduct and socialisation. Mainstream school placement may not always offer the best prospects for a child with ASD.

11	Ostmeyer and Scarpa (2012)	Examining the purpose of informing development of a school-based social skills programme for children with high-functioning autism spectrum disorders	Fourteen staff members, two mothers of children with HFASD and two children with HFASD	Mixed methods using participatory action research, focus groups or individual meetings, questionnaires and classroom observations	Using mixed methods and participatory action research, this study demonstrated the need for social skills interventions and it outlined the barriers to the implementation of these interventions.
12	Silveira-Zaldivar and Curtis (2019)	Exploring the barriers to the implementation of evidence-based practices (EBPs) for social skills for students with HFASD in early elementary inclusive settings	Thirty-two public school educators related to the district inclusion programme and one parent of a child with HFASD in an inclusive setting	Mixed methods using surveys, focus groups, semi-structured interviews and researcher field notes	Top six barriers to the successful implementation of evidence-based practices for social skills were training, time, support, prioritisation, materials and staff mindset. Three key factors necessary for successful implementation are support, preparation and motivation.

Findings and Discussion

The studies in Table 2 investigated the effects inclusive education may have on children with ASD along with teachers' experiences on this issue. Findings demonstrated that barriers to inclusive education and enablers of inclusive education are the two main themes found. Barriers to inclusive education relate to inhibitors and challenges that children with ASD, their peers and their teachers face in maintaining an environment that is equal and that provides everyone with a meaningful learning experience. Enablers of inclusive education relate to practical classroom strategies, approaches and attitudes that would promote inclusion for all and have positive outcomes and feelings. These main themes were found, along with four sub-themes that included:

- School environment
- Educational supports
- Children's relationships
- Communication/collaboration

School Environment

The school environment relates to the atmosphere, ethos and physical elements within a school that either impede or promote inclusive education. Majoko (2016) identified challenges and opportunities within an inclusive environment for children with ASD. One such obstacle relates to difficulties teachers may have in creating an understanding atmosphere that supports peer acceptance for children with ASD. It was also concluded that this environment may be difficult for children with ASD as it may be overwhelming. These children may find noise levels and class sizes a challenge (Lindsay et al., 2013; Zazzi and Faragher, 2018; Silveira-Zaldivar and Curtis, 2019). However, Majoko (2016) identified several benefits to an inclusive environment for children with ASD such as opportunities for peer interactions and access to the curriculum. Developmental play, classroom routines, structured schedules, peer education, visual supports, physical

development and contextual learning are all environmental factors that can be used to promote inclusive pedagogies (Majoko, 2016; Zazzi and Faragher, 2018; Silveira-Zaldivar and Curtis, 2019; Gledhill and Currie, 2020).

Educational Supports

Findings demonstrate that educational supports that incorporate resources, training, funding, preparation and psychological provisions accommodate inclusive education for a child with ASD. Barriers to successful inclusion of children with ASD identified in these studies included training, resources, support, time and teacher attitudes. Findings illustrate that training was insufficient. This was due to 'low levels of preservice preparation for educating students with ASD' and 'low levels of feelings of qualification, confidence and effectiveness were portrayed' (Finch et al., 2013, p.19). Teachers who lack confidence or hold negative attitudes share the need for more training and resources. However, teachers who consider they have adequate resources hold more positive attitudes, and teachers who gain experience from teaching a child with ASD have more confidence to facilitate their needs (Anglim, Prendeville and Kinsella, 2018; Leonard and Smyth, 2020).

Children relationships

Children relationships encompass children with ASD and their behaviour, and the ways in which interactions affect their relationships with peers. However, it is important to note that their peers' attitudes and their sense of engagement with each other should also be considered. Rotheram-Fuller et al. (2010) report that children with ASD often have difficulty making friends and establishing a social network. Children with ASD often exhibit what could be considered disruptive behaviour, presenting challenges for teachers in managing their behaviour along with maintaining mainstream classroom management. However, Simpson and Bui (2016) assert that their typically developing peers hold positive perceptions of children with ASD. Typically developing peers were observed to be generally understanding, helpful and positive towards children with ASD and made an effort to include them, which is very important. Majoko (2016) further acknowledges that increasing understandings of the needs of children with ASD for typically developing peers would help facilitate inclusion.

Communication/Collaboration

Communication and collaboration relate to teamwork and a holistic school approach. This means that children with ASD, their parents, peers, teachers, teachers' co-workers, principals and educational boards are all involved in working towards shared goals for inclusive education. A lack of communication and a lack of awareness of this disorder are identified as challenges for staff and parents in some studies. Finch et al. (2013), Lindsay et al. (2013) and Silveira-Zaldivar and Curtis (2019) report a need for collaboration and communication, with some educators identifying a sense of isolation and some finding it difficult to work with others. Finch et al. (2013) recorded collaboration as the main form of support amongst staff members when educating children with ASD. Collaboration allows for the sharing of resources and thus minimises costs, while increasing access to resources for children with ASD and providing teachers with further support (Silveira-Zaldivar and Curtis, 2019).

There exists a debate over whether a special classroom or mainstream classroom is more appropriate for the child's needs with regard to the school environment for children with ASD. Reed, Osborne and Waddington (2012) argue in favour of a special classroom environment due to concerns regarding conduct and behaviour while Ostmeyer and Scarpa (2012) and Gledhill and Currie (2020) ascertain that a mainstream classroom proves more beneficial in supporting the development of children's social skills. Hornby (2003) argues that the level of inclusion that a school has should be based on the individual needs and experiences of the children within that school environment. This may suggest that the school should provide a special classroom environment for those children with ASD who cannot cope well within mainstream education. However, if the school considers that a child may benefit from being in a mainstream environment, this child could be accommodated within the mainstream environment. As such, this recommendation reflects the 'no-one-size-fits-all' idea. Goodall (2015) outlines how there are no clear outcomes regarding which environment is better for educational achievement. Therefore, the question of whether the mainstream environment is appropriate for individualised needs that include behavioural, emotional and academic needs is an open one (Lal, 2005). Educational supports are an important factor when catering for the needs of a child with ASD in providing them with a meaningful learning environment (NCSE, 2015). The studies outlined many challenges for educational supports such as time, training, resources and support. The NCSE (2016b) explain that in special classes within the Irish context, the student–teacher ratio of 6:1 includes the provision of two SNAs to support the learning of children with ASD as support for more focused attention. In mainstream education, a child with ASD is therefore given 4.25 hours of resource teaching.

Freeman and Alkin (2000) and Gledhill and Currie (2020) favour the use of the mainstream environment for its social development benefits for children with ASD. However, this can present further challenges such as bullying, self-imposed isolation, and behavioural difficulties (Rotheram-Fuller et al., 2010; Ostmeyer and Scarpa, 2012; Lindsay et al., 2013; Anglim, Prendeville and Kinsella, 2018; Silveira-Zaldivar and Curtis, 2019; Gledhill and Currie, 2020). The American Psychiatric Association (2013) identifies a deficit in social communication that can hinder learning for children with ASD, especially when such learning requires social interactions with their peers. However, Simpson and Bui's (2016) study shows how an intervention programme can foster positive interactions between children with ASD and their peers and promote learning through shared reading. A holistic approach amongst all stakeholders in the school environment might thus aid this process.

Stevens and O'Moore (2009) discuss how a whole-school approach that reflects positive attitudes amongst all staff members is needed for successful inclusive education. Findings from this research highlights that if teachers and schools share resources, then strategies and collaborative ideas might help to overcome the educational support challenges experienced (Silveira-Zaldivar and Curtis, 2019). Communication and collaboration with children with ASD and their peers can enable spaces for teachers to ensure they maximise a positive learning experience for all learners. This communication and collaboration can be used to increase awareness and promote diversity. It can further support teachers to build meaningful relationships with children with ASD. This may inform teachers on what children with ASD need and what teachers can do to facilitate those needs (Lindsay et al., 2013; Goodall, 2015; Zazzi and Faragher, 2018). Collaboration amongst stakeholders involves the bringing together of the voices of

children and their parents and listening actively to their insights and experiences along with the expertise fellow practitioners may have along with ongoing knowledge gained from academic researchers (Ainscow and Messiou, 2018). It is communication that Gledhill and Currie (2020) believe to be key to the implementation of effective social support strategies.

Conclusion

The findings of this research reveal four key factors that determine the way in which inclusive education impacts social development. These comprise environment, educational supports, children relationships, and communication/collaboration. Reed, Osborne and Waddington (2012) assert that a special classroom is more beneficial for the child's behaviour and conduct. The NCSE (2016b) describes a high level of support that children with ASD receive within a learning environment. However, in terms of social development, the research suggests that a mainstream classroom would be more beneficial to learners with ASD (Freeman and Alkin, 2000; Gledhill and Currie, 2020). Within a special classroom, there is an element of segregation and fewer opportunities to have social interaction opportunities (NCSE, 2014). Behavioural, emotional and academic needs are important considerations for successful placement for a child with ASD within an inclusive education model. Teachers play a pivotal role in facilitating the type of learning environment for a child with ASD. It is also evident that teacher attitudes impact the level of support given to children with ASD within an inclusive environment. Communication and collaboration are vital here. The teacher needs to communicate with the child with ASD to understand individualised needs and to build a rapport with this child. Communicating with the administrators about challenges to implementing certain strategies enable administrators to identify experienced problems. Together, teachers and administrators could work collaboratively to find a workable solution (Leonard and Smyth, 2020). Ultimately, positive attitudes amongst staff and a holistic approach are fundamentally needed for successful inclusive education to promote the social development of a child with ASD (Stevens and O'Moore, 2009).

References

Ahmed, J.U. (2010) 'Documentary research method: new dimensions', *Indus Journal of Management & Social Sciences*, 4, pp.1–14. [Online] Available at: https://www.researchgate.net/publication/227441751 (Accessed: 11 December 2020).

Ainscow, M. and Messiou, K. (2018) 'Engaging with the views of students to promote inclusion in education', *Journal of Educational Change*, 19(1), pp.1–17.

American Psychiatric Association (2013) *Diagnostic and statistical manual of mental disorders*. 5th edn. Arlington.

Anglim, J., Prendeville, P. and Kinsella, W. (2018) 'The self-efficacy of primary teachers in supporting the inclusion of children with autism spectrum disorder', *Educational Psychology in Practice*, 34(1), pp.73–88. [Online] Available at: https://doi.org/10.1080/02667363.2017.1391750 (Accessed: 10 December 2020).

Christensen, D., Baio, J., Van Naarden Braun, K., Bilder, D., Charles, J., Constantino, J., Daniels, J., Durkin, M., Fitzgerald, R., Kurzius-Spencer, M., Lee, L., Pettygrove, S., Robinson, C., Schulz, E., Wells, C., Wingate, M., Zahorodny, W. and Yeargin-Allsopp, M. (2020) 'Prevalence of autism spectrum disorder among children aged 8 years — Autism and Developmental Disabilities Monitoring Network, 11 sites, United States, 2012', *MMWR Surveillance Summaries*, 69(4), pp.1–12. [Online] Available at:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6237390/ (Accessed: 09 December 2020).

Clarke, V. and Braun, V. (2017) 'Thematic analysis', *The Journal of Positive Psychology*, 12(3), pp.297–298. [Online] Available at: http://dx.doi.org/10.1080/17439760.2016.1262613 (Accessed: 12 December 2020).

Cooper, H.M. (1982) 'Scientific guidelines for conducting integrative research reviews', *Review of Educational Research*, 52(2), pp.291–302. [Online] Available at: https://doi.org/10.3102/00346543052002291 (Accessed: 09 December 2020).

Cooper, H. (1998*) Synthesizing research: a guide for literature reviews*. 3rd edn. New York: Sage Publications.

Creswell, J.W. (2009) *Research design: qualitative, quantitative, and mixed methods approaches*. 3rd edn. Los Angeles: Sage Publications, Inc.

Finch, K., Watson, R., MacGregor, C. and Precise, N. (2013) 'Teacher needs for educating children with autism spectrum disorders in the general education classroom', *Journal of Special Education Apprenticeship*, 2(2), pp.1–26. [Online] Available at: https://files.eric.ed.gov/fulltext/EJ1127818.pdf (Accessed: 05 January 2021).

Freeman, S.F.N. and Alkin, M.C. (2000) 'Academic and social attainments of children with mental retardation in general education and special education settings', *Remedial and Special Education*, 21, pp.2–18. [Online] Available at: https://doi.org/10.1177/074193250002100102 (Accessed: 05 January 2021).

Gilmore, H. (2019) 'Levels of autism: understanding the different types of ASD', *Psych Central Professional*, 15 November. [Online] Available at: https://pro.psychcentral.com/child-therapist/2019/11/levels-of-autism-understanding-the-different-types-of-asd/ (Accessed: 07 November 2020).

Gledhill, J. and Currie, J.L. (2020) 'Characteristics of teachers' recommended social support strategies for primary students with ASD', *International Online Journal of Primary Education*, 9, pp.18–34. [Online] Available at: https://files.eric.ed.gov/fulltext/EJ1258470.pdf (Accessed: 02 January 2021).

Goodall, C. (2015) 'How do we create ASD-friendly schools? A dilemma of placement', *Support for Learning*, 30(4), pp.305–326. [Online] Available at: https://doi.org/10.1111/1467-9604.12104 (Accessed: 05 January 2021).

Guba, E.G. and Lincoln, Y.S. (1994) 'Competing paradigms in qualitative research', in Denzin, N.K. and Lincoln, Y.S. (eds.) *Handbook of qualitative research.* Thousand Oaks, CA: SAGE, pp.105–117.

Hornby, G. (2003) 'Inclusion or delusion: can one size fit all?', *Support for Learning*, 14(4), pp.152–157. [Online] Available at: https://doi.org/10.1111/1467-9604.00122 (Accessed: 02 January 2021).

Humphrey, C. (2013) 'A paradigmatic map of professional education research', *Social Work Education*, 32, pp.3–16. [Online] Available at: http://dx.doi.org/10.1080/02615479.2011.643863 (Accessed: 05 January 2021).

Kapp, S.K., Gillespie-Lynch, K., Sherman, L.E. and Hutman, T. (2013) 'Deficit, difference, or both? Autism and neurodiversity', *Developmental Psychology*, 49, pp.59–71. [Online] Available at: https://doi.org/10.1037/a0028353 (Accessed: 06 January 2021).

Kivunja, C. and Kuyini, A.B. (2017) 'Understanding and applying research paradigms in educational contexts', *International Journal of Higher Education*, 6(5), pp.26–41. [Online] Available at: https://doi.org/10.5430/ijhe.v6n5p26 (Accessed: 07 December 2020).

Lal, R. (2005) 'Effect of inclusive education on language and social development of children with autism', *Asia Pacific Disability Rehabilitation Journal*, 16, pp.77–84 [Online]. Available at: http://www.aifoeng.it/archives/disability/apdrj/2005_jan_apdrj.pdf#page=77 (Accessed: 08 September 2020).

Leonard, N. and Smyth, S. (2020) 'Does training matter? Exploring teachers' attitudes towards the inclusion of children with autism spectrum disorder in mainstream education in Ireland', *International Journal of Inclusive Education*, pp.1–15. [Online] Available at: https://doi.org/10.1080/13603116.2020.1718221 (Accessed: 09 September 2020).

Lindsay, S., Proulx, M., Thomson, N. and Scott, H. (2013) 'Educators' challenges of including children with autism spectrum disorder in mainstream classrooms', *International Journal of Disability, Development and* Education, 60(4), pp.347–362. [Online] Available at: https://doi.org/10.1080/1034912X.2013.846470 (Accessed: 09 September 2020).

Majoko, T. (2016) 'Inclusion of children with autism spectrum disorders: listening and hearing to voices from the grassroots', *Journal of Autism and Developmental Disorders*, 46(4), pp.1439–1440. [Online] Available at: https://doi.org/10.1007/s10803-015-2685-1 (Accessed: 05 December 2020).

McWatters, M. (2016) 'A Q&A about autism with Steve Silberman, author of NeuroTribes', *TED-ed blog*, 17 August. Available at: https://blog.ed.ted.com/2016/08/17/a-qa-about-autism-with-steve-silberman-author-of-neurotribes/ (Accessed: 07 November 2020).

Morgan, D.L. (2014) *Integrating qualitative and quantitative methods: a pragmatic approach*. [Online] Available at: https://dx.doi.org/10.4135/9781544304533 (Accessed: 15 September 2020).

National Council for Special Education (NCSE) (2014) *Understanding special class provision in Ireland.* [Online] Available at: https://ncse.ie/wp-content/uploads/2014/10/Report_16_special_classes_30_04_14.pdf (Accessed: 08 September 2020).

National Council for Special Education (NCSE) (2015) *Supporting students with autism spectrum disorder in schools.* [Online] Available at: http://ncse.ie/wp-content/uploads/2016/07/1_NCSE-Supporting-Students-ASD-Schools.pdf (Accessed: 14 September 2020).

National Council for Special Education (NCSE) (2016b) *An evaluation of education provision for students with autism spectrum disorder in Ireland*. [Online] Available at: https://ncse.ie/wp-content/uploads/2016/07/5_NCSE-Education-Provision-ASD-Students-No21.pdf (Accessed: 08 September 2020).

Noble, H. and Smith, J. (2018) 'Reviewing the literature: choosing a review design', *Evidence-Based Nursing,* 1(2), pp.39–41. [Online] Available at: http://dx.doi.org/10.1136/eb-2018-102895 (Accessed: 07 September 2020).

Ostmeyer, K. and Scarpa, A. (2012) 'Examining school-based social skills program needs and barriers for students with high-functioning autism spectrum disorders using participatory action research', *Psychology in the Schools*, 49(10), pp.932–940. [Online] Available at: https://doi.org/10.1002/pits.21646 (Accessed: 08 September 2020).

Ousley, O. and Cermak, T. (2014) 'Autism spectrum disorder: defining dimensions and subgroups', *Current Developmental Disorders Reports*, 1, pp.20–28. [Online] Available at: https://doi.org/10.1007/s40474-013-0003-1 (Accessed: 05 December 2020).

Reed, P., Osborne, L. and Waddington, E. (2012) 'A comparative study of the impact of mainstream and special school placement on the behaviour of children with autism spectrum disorders', *British Educational Research Journal*, 38(5), pp.749–763. [Online]

Available at: https://doi.org/10.1080/01411926.2011.580048 (Accessed: 06 November 2020).

Rotheram-Fuller, E., Kasari, C., Chamberlain, B. and Locke, J. (2010) 'Social involvement of children with autism spectrum disorders in elementary classrooms', *Journal of Child Psychology and Psychiatry*, 51(11), pp.1227–1234. [Online] Available at: https://doi.org/10.1111/j.1469-7610.2010.02289.x (Accessed: 05 December 2020).

Schick-Makaroff, K., MacDonald, M., Plummer, M., Burgess, J. and Neander, W. (2016) 'What synthesis methodology should I use? A review and analysis of approaches to research synthesis', *AIMS Public Health*, 3, pp.172–215. [Online] Available at: http://dx.doi.org/10.3934/publichealth.2016.1.172 (Accessed: 03 January 2021).

Silveira-Zaldivar, T. and Curtis, H. (2019) '"I'm not trained for this!" and other barriers to evidence-based social skills interventions for elementary students with high functioning autism in inclusion', *International Electronic Journal of Elementary Education*, 12, pp.53–66. [Online] Available at: https://doi.org/10.26822/iejee.2019155337 (Accessed: 04 January 2021).

Simpson, L.A. and Bui, Y. (2016) 'Effects of a peer-mediated intervention on social interactions of students with low-functioning autism and perceptions of typical peers', *Education and Training in Autism and Developmental Disabilities*, 51(2), pp.162–178. [Online] Available at: https://www.jstor.org/stable/24827545 (Accessed: 05 January 2021).

Stevens, P. and O'Moore, M. (2009) *Inclusion or illusion: educational provision for primary school children with mild general learning disabilities.* Blackrock, Co. Dublin: Blackhall Publishing.

Taveggia, T.C. (1974) 'Resolving research controversy through empirical cumulation: toward reliable sociological knowledge', *Sociological Methods and Research*, 2(4), pp.395–407. [Online] Available at: https://doi.org/10.1177/004912417400200401 (Accessed: 05 December 2020)

Toronto, C. and Remington, R. (2020) *Step-by-step guide to conducting an integrative review*. Springer International Publishing AG.

United Nations Educational, Scientific and Cultural Organization (UNESCO) (2017) *A guide for ensuring inclusion and equity in education.* [Online] Available at: https://unesdoc.unesco.org/ark:/48223/pf0000248254/ (Accessed: 04 September 2020).

United Nations Educational, Scientific and Cultural Organization (UNESCO) (2019) *Inclusion in education*. Available at: https://en.unesco.org/themes/inclusion-in-education (Accessed: 04 September 2020).

Whittemore, R. and Knafl, K. (2005) 'The integrative review: updated methodology', *Journal of Advanced Nursing*, 52(5), pp.546–553. [Online] Available at: https://doi.org/10.1111/j.1365-2648.2005.03621.x (Accessed: 04 September 2020).

Zazzi, H. and Faragher, R. (2018) '"Visual clutter" in the classroom: voices of students with autism spectrum disorder', *International Journal of Developmental Disabilities*, 64(3), pp.212–224. [Online] Available at: https://doi.org/10.1080/20473869.2018.1468619 (Accessed: 06 January 2021).

An Exploration of Approaches to Outdoor Learning in Maths and Science

Emily Jones

Biography

Emily Jones graduated with a Bachelor of Science (Hons) Degree from University College Dublin and went on to work in the science industry. She then continued her studies at UCD and graduated with a First-Class Honours Master's Degree in Food, Nutrition and Health. Emily worked as a senior sailing instructor and programme director at yacht clubs in Ireland and the US over several seasons. In this role, she gained experience working with children of all ages. Graduating with First-Class Honours in the Professional Master of Education (PME) from Hibernia College in 2021, Emily has now completed her first year of teaching Sixth Class at a primary school in Dublin. Emily's research on this project and her keen interest in outdoor education have inspired her to create engaging maths and science outdoor activities with her students.

An Exploration of Approaches to Outdoor Learning in Maths and Science, by Emily Jones

Research Supervisor: Norah Sweetman

Abstract

This integrative literature review explored the approaches used by teachers to incorporate outdoor learning effectively into their teaching of maths and science. The challenges associated with outdoor learning in maths and science were also investigated, along with the strategies used to navigate these challenges. Twelve papers were carefully selected for this project; these papers were explored through thematic analysis, and five main themes were uncovered. The papers emphasised the importance of fun activities that are relevant to the children's lives, while several papers detailed how iPads could be used during outdoor learning activities. The role of group work in outdoor learning was also evident, along with the importance of experiences in nature for both children and teachers.

Keywords: Outdoor learning, nature, maths, science, challenge

Introduction and Background

Outdoor Learning Overview

Learning outdoors enables children to experience nature and explore in meaningful, real-life contexts. A study by Lee and Bailie (2019) found that participating in inquiry-based activities outside gives children the opportunity to use their senses and practise their observation skills. It also showed that children can develop recording, writing, drawing, teamwork, fine and gross motor skills when engaging in outdoor learning activities such as nature trails for maths and science. Along with developing a range of skills, outdoor learning has been found to increase physical activity and decrease sedentary time, when compared with traditional indoor learning (Romar et al., 2019). It is recommended that children take at least 60 minutes of activity, at moderate to vigorous levels, every day (Healthy Ireland and Department of Health, 2020). Moving while learning outdoors could help them to achieve this level of physical activity.

Outdoor Learning — Maths

Outdoor maths trails can help children to understand and enjoy maths in real-life contexts. By doing maths activities outside, children begin to see maths as an everyday life skill (Moffett, 2011). Exemplar one in the maths teacher guidelines for Irish primary schools is a maths trail based on the delivery of post (National Council for Curriculum and Assessment, 1999a, pp.49–53). This trail would involve the children taking the route of a post person, observing and investigating maths along the way. Maths trails are also promoted by Maths Week Ireland — they give helpful examples on their website (Maths Week, 2020). Maths Eyes is an Irish initiative that encourages children to look at maths all around them; they have ideas for maths trails and run competitions each year (Maths Eyes, 2020).

Field trips in the local area can provide valuable mathematical learning opportunities, along with giving the children the chance to explore their community. Common outdoor sites that can be suitable field trip locations include architectural structures and bridges, sports venues, performance spaces, zoos and local airports. A project that involved field trips to these locations found that the visits provided teachers with ideas for formulating real-life maths problems, which the children could relate to (Courtney, Caniglia and Singh, 2014).

Outdoor Learning — Science

The science teacher guidelines for Irish primary schools give exemplars and information about teaching science outdoors, along with practical advice for teachers (NCCA, 1999b). A study by Boaventura et al. (2013) outlined the importance of providing meaningful outdoor scientific experiences for children. They found that children should explore through practical activities as this will help them to understand the scientific process. These findings were similar to those of Solomon et al. (1994), who found that when the children reflected on and discussed different stages of experiments, it helped them to understand the scientific process.

Integration

Often, outdoor learning opportunities in maths and science link with other subjects such as literacy, history and the arts (Green and Rayner, 2020). Literacy can be effectively integrated with outdoor science learning according to Eick (2012), who found that children practised their reading comprehension strategies when reading instructions or information related to the outdoor science class. Outdoor science learning can integrate with the physical education (PE) curriculum, providing the children with the chance to be active outside. A science and physical activity programme by Finn, Yan and McInnis (2018) included activities such as hiking, soil and water sampling, archery, canoeing and team games.

Teachers' Experiences

Teachers' own experiences in nature can affect their attitudes towards teaching outdoors. Shume and Blatt (2019) studied a group of pre-service teachers and found that they had positive experiences in nature during their own childhoods. These teachers recognised the value of outdoor learning and intended to facilitate outdoor learning for their future students. Similarly, Blatt and Patrick (2014) found that pre-service teachers who had meaningful childhood experiences outdoors felt a responsibility to expose their students to the natural environment. A training partnership based in Belfast, which was evaluated by Moffett (2011), showed that student teachers valued the experience of participating in outdoor maths trails with class teachers and college tutors. The training helped them to develop their competence and confidence for outdoor teaching.

There are many challenges faced by schools when it comes to outdoor learning. The major challenges found by Edwards-Jones, Waite and Passy (2018) included policy-, place-, weather-, resource- and people-related issues. They recognised the need to develop staff confidence to teach outside and the need for leaders to promote outdoor learning. Another study found that barriers to outdoor learning included a lack of funding, along with the fact that learning outcomes can be less predictable and specific when outdoors (Waite, 2010).

Assessment

When outdoor learning takes place through play and group activities, children tend to see the outdoors as a place for self-expression rather than just a place for formal learning (Sahrakhiz, Harring and Witte, 2018). Assessing children outdoors has great potential when outdoors teachers can identify aspects of development that may not be seen when indoors (Davies and Hamilton, 2018). These researchers discovered that during outdoor learning, children responded more freely to questioning as they were not always aware that they were being assessed. These studies show that children may feel under less pressure when learning outdoors, which allows for child-centred learning.

Policy and Outdoor Learning in Other Countries

A report on science learning in Irish primary schools found that children enjoyed working outdoors during science class, on field trips and in the school grounds. However, relatively few instances of outdoor learning were recorded during the study (although it did take place from October to February, so the weather conditions may not have been ideal) (NCCA, 2008). In the United Kingdom (UK), a report on outdoor learning indicated that learning outdoors can significantly raise standards and improve pupils' social, emotional and personal development. Outdoor learning was most successful when it was well planned and linked to activities in the classroom. This report also gave examples of maths and science experiences outdoors (Office for Standards in Education, Children's Services and Skills, 2008).

While there is a lack of policy relating to outdoor learning in Ireland, the Department for Education and Skills (DfES) in the UK launched a 'Learning Outside the Classroom' manifesto. This states that 'every young person should experience the world beyond the classroom as an essential part of learning and personal development, whatever their age, ability or circumstances' (DfES, 2006, cover page ii). Education Scotland also released a policy document on outdoor learning with practical guidance for teachers. It outlines how children need to engage with maths in meaningful contexts to enable them to develop a solid understanding of mathematical concepts. Using real-life outdoor situations can help them to understand abstract ideas. The same applies to learning science — real-life outdoor experiences can enhance the theoretical ideas taught in the classroom. Many elements of science are better suited to outdoor learning; being outdoors helps children to connect with the natural world (Education Scotland, 2009). In Denmark, an increasing number of teachers are teaching outside for one day every week or fortnight; the Danish call it *udeskole*. This practice integrates a number of subjects across the curriculum and is carried out in the local environment by the class teacher (Bentsen and Jensen, 2012).

Outdoor classrooms have great potential in developing countries where indoor classrooms may be in poor condition. A small-scale study in Bangladesh found that an outdoor classroom resulted in significant improvements in the children's achievements in science tests, along with greater levels of enjoyment and participation among the children. The outdoor classroom provided children with better lighting, acoustics and seating (Khan, McGeown and Islam, 2019). Research indicates the importance of outdoor learning for children's development and the benefits it can provide. There are also challenges encountered by teachers when it comes to incorporating outdoor learning into their maths and science teaching. While there is research and international policy in

this area, there appears to be a lack of Irish policy on this aspect of education. This initial research process led to the following research questions:

1. How do teachers incorporate outdoor learning effectively into their teaching of maths and science?
2. What are the challenges associated with outdoor learning in maths and science, and how do teachers overcome these challenges?

Methodology

Paradigm and Methodology

This project is an integrative literature review and analyses research from both positivist and interpretivist paradigms. However, it is fundamentally interpretivist in nature as it involves the researcher interpreting the findings from various papers and seeking to establish the greater meaning of this information. This project uses thematic analysis when exploring the papers, which is associated with an interpretivist approach (Creswell, 2013).

Research Design — Documentary Research

The data analysed in documentary research already exists in the form of a variety of documents. There is no collection of primary data as there would be in some other studies. When carrying out documentary research, the processes should be rigorous and transparent, just like other forms of research, to ensure the quality of the study (Tight, 2019). Documentary research is suitable for this study as there is a range of literature available on outdoor learning in maths and science, and the challenges that are associated with this type of learning.

Integrative Literature Review (ILR)

An integrative review is broad and can include experimental and non-experimental research simultaneously. It provides a greater understanding of a topic and can be used for a variety of purposes (Whittemore and Knafl, 2005). A more holistic understanding of the particular topic can be provided with an integrative review because it analyses information from diverse sources. Whittemore and Knafl (2005) have provided advice on the process of completing an integrative review, which helps to address any inconsistencies and form a more rigorous method, as outlined below.

There is a five-step process in conducting literature reviews, which was introduced by Cooper (1998). The stages are (1) problem formulation, (2) literature search, (3) data evaluation, (4) data analysis, and (5) presentation (Whittemore and Knafl, 2005). This is the framework that has been used for this particular integrative review. The details of each stage are as follows:

Step One — Problem Formation

The initial step in this integrative review was to choose an area of research and specify clear research questions.

Step Two — Literature Search

When searching for literature, a number of key terms were selected based on the research questions and the exploratory reading. The terms used for the search were: outdoor, outside, nature, learning, education, class, school, trail, teaching, math and science. Boolean logic was used in this search; this helped to find relevant papers while excluding irrelevant ones. Three databases were searched to find suitable papers — Education Source, Academic Source Complete, and Taylor and Francis. The papers had to be published in peer-reviewed journals in the last ten years to be included.

Step Three — Evaluation

The search was narrowed down to twelve papers by reading and evaluating the titles, abstracts and full articles. The articles were examined, taking into consideration:

- Relevance to the specific research questions
- Sufficient detail on the context of the study
- Suitable methods and sampling, including detail on the participants
- Transparent process of data analysis
- Rigour in the whole process of carrying out and reporting the study

Table 1 below illustrates the process of refining the search for suitable papers. This resulted in a total of twelve papers remaining to be analysed.

Table 1: Screening Process for Selecting Papers

Database/Source	Records screened	Abstracts read	Articles read/ evaluated	Included
Education Source	38	16	7	3
Academic Search Complete	59	7	5	2
Taylor and Francis	48	16	10	7
Total	145	39	22	12

Step Four — Analysis, and Step Five — Presentation

To analyse the twelve papers, a summary table was written, which included information about the methodology and methods, the participants, and a brief summary of the findings. Thematic analysis was then carried out to answer the research questions, using Braun and Clarke's (2006) model.

Rigour and Ethics

In order to ensure rigour throughout the entire process of this project, the methodology suggested by Whittemore and Knafl (2005) was employed. Transparency was important in this study, and clear details of each step in the research process were provided. Another important aspect to ensuring rigour was reflexivity — the researcher must be aware of and reflect on their own thoughts, values and potential biases.

The ethical issues to be considered when completing an integrative literature review include the potential for bias and selectivity. To prevent these issues from arising, the methodology advised by Whittemore and Knafl (2005) was used, as described above. The measures taken to ensure that the project was conducted ethically included: specifically outlined selection criteria when searching for and evaluating literature, a transparent data evaluation process, and a detailed thematic analysis process (Braun and Clarke, 2006). The criteria for evaluating literature took into consideration the process that had been followed and the detail that had been reported in each study. This review only included studies that met these criteria when carrying out the analysis.

Findings and Discussion

Summary and Critique of Selected Papers

The final twelve papers were published over a ten-year period, from 2010 to 2020. This final selection included eight qualitative, one quantitative and three mixed-methods studies. Various methods of data collection were used in the selected papers. These included interviews, discussions, questionnaires, academic tests, video recordings, written responses and drawings.

The varied groupings of participants in these studies provide information on outdoor learning in maths and science from many points of view, including children of different ages, student teachers and experienced teachers. Five of the studies took place at primary schools, while others were based on student teachers in primary education courses. Summer nature programmes were also included, while another paper investigated teachers from kindergartens. One study was based in a secondary school with children aged 13 and their teachers. Table 2 offers a summary of the selected papers, including authors, purpose, sample, methodological approach and findings.

Table 2: Summary of Selected Papers

	Authors	Purpose	Sample	Methodology	Findings/Summary
1	Eick (2012)	To examine how this teacher uses the school's outdoor classroom and nature study to connect to her science curriculum	A third-grade teacher and 22 third-grade students	Narrative approach case study with daily journals, semi-structured interviews, lesson plans and related documents	Outdoor learning can provide a real-world context for children learning science. It can be integrated in schools even when there is pressure on test results because science is still valued. The teacher had strong beliefs and life experiences, which supported her to teach science outdoors.

2	Tas and Gülen (2019)	To investigate the effect of outdoor learning activities on students' academic success in science. To investigate the students' thoughts on these outdoor science activities	19 seventh-grade students	Mixed methods — academic achievement test and open-ended questions in a structured interview form	The use of outdoor learning activities is recommended in science as this was found to increase the academic success of the students. Outdoor education activities and games can help students with their understanding of science. Educational games and drama activities were most popular with the students during outdoor science lessons.
3	Tal and Morag (2013)	To explore the challenges in the school relating to outdoor environmental education	6 teachers and 1 former teacher from one elementary school	Interpretative longitudinal case study, with semi-structured interviews and observation of three field trips	The challenges faced by this school regarding outdoor environmental education were related to changes in the school culture. The different school culture reflected changes in the community, changes in the staff and changes with the way that environmental education was integrated.
4	Jung, Zimmerman and Land (2019)	To investigate how children's situational interests were triggered and developed during an outdoor, tablet-mediated biology learning programme	54 children aged 9–11 at a summer nature programme	Qualitative case study using thematic analysis and video recordings	The children's situational interest was triggered through their interactions with the mobile app and surrounding trees. Their interests were maintained throughout the session by projecting their emotional and cognitive engagement. The findings suggest that including tactile, open-ended activities while accounting for differentiation is beneficial for learning.
5	Khan, McGeown and Islam (2019)	To investigate the impact of an outdoor classroom on students' learning and engagement in science	30 children aged 9–10	A quasi-experimental, mixed-methods study using achievement tests, a questionnaire and a focus group with children and teachers	Children's science scores were significantly higher after they had been taught outdoors. Physical qualities of the outdoor classroom (lighting, acoustics, seating) along with active participation and greater enjoyment likely explained this.

6	Moffett (2011)	To explore a partnership project in which student teachers worked alongside classroom teachers to create outdoor activities in primary mathematics	28 first and second year student teachers enrolled on a four-year programme in primary education, specialising in mathematics	Qualitative study including questionnaires and informal discussions with teachers and student teachers. Pupils also completed age-appropriate questionnaires.	A partnership like this provides teachers and student teachers with a supporting framework to help them develop confidence, competence and enthusiasm for creating and providing outdoor learning experiences
7	Blatt and Patrick (2014)	To explore how pre-service teachers' past outdoor experiences contributed to their attitudes to taking their own students outdoors	148 undergraduate pre-service elementary teachers enrolled in a science teaching methods course	Qualitative study analysing essay responses	The pre-service teachers had meaningful youth experiences outdoors. Many of them felt a responsibility to bring their students outdoors and teach them about nature.
8	Subramaniam (2019)	To investigate student teachers' conceptions of teaching life science outdoors	99 student teachers enrolled in an elementary science methods course	Qualitative study using drawings and written narratives	Student teachers' conceptions of teaching life science outdoors were as follows: life science is taught in the school yard; it is teacher-directed; and it is disconnected from in-class instruction.
9	Skarstein and Ugelstad (2020)	To explore how outdoor time is used in Norwegian kindergartens as a resource for educational activities regarding science education	Twelve teachers representing nine kindergartens (where the children are aged 3–6)	Mixed-methods research using questionnaires and a focus group interview	Teachers often taught science outdoors spontaneously, and they emphasised different themes to suit the environment. A lack of time was a common challenge when teaching science outdoors; in particular, a lack of time for planning and acquiring the knowledge necessary to teach all the curriculum goals.
10	Zimmerman, Land, Maggiore and Millet (2019)	To investigate the type of scientific sense-making conversations and the engagement with nature that children have while using an iPad app	50 children aged 6–10 at a summer nature programme	Qualitative analysis using observations, photographs, drawings and video recordings	Outdoor spaces were augmented to reveal scientific aspects that might not be visible to novice learners. Using the iPads, children engaged in describing, identifying and interpreting talk related to science. They used iPads and proximity transmitters to control the amount of science content presented, based on their proximity to the specimens.

11	McClain and Zimmerman (2016)	To explore children's sensory and social engagement with nature when they are using an iPad-based, e-trailguide app	83 children aged 8–11 at a summer nature programme	Qualitative analysis using video-based data collection	Several features of the e-Trailguide app enabled children's engagement with nature. Their interactions included observation, pointing and tactile investigation. There was also increased engagement with nature when children used an interactive data collection tool in the e-Trailguide.
12	Fägerstam and Samuelsson (2014)	To explore the influence of outdoor teaching on arithmetic performance	86 students aged 13 and their five teachers	A quasi-experimental quantitative study with an outdoor and a traditional (indoor) group. A test and questionnaire were used before and after the 10-week period.	Outdoor teaching in mathematics facilitated cooperative and communicative learning. It also had a positive effect on intrinsic motivation. There was a small but significant difference between the groups — the outdoor group increased their performance more than the traditional group.

Themes and Discussion

In this review, the approaches that teachers use when incorporating outdoor learning into their teaching of maths and science are explored. The challenges associated with outdoor learning in maths and science are also investigated, along with the ways in which teachers navigate these challenges. Through analysing the selected literature, several approaches to outdoor learning were uncovered, i.e. including suitable activities, using software applications (apps) on iPads and working in small groups. The analysis also revealed the relevance of experiences in nature and training for teachers. These themes are each described in the context of the selected papers. They are also discussed taking wider research into consideration.

1. Outdoor learning activities

The paper by Tas and Gülen (2019), which was based in Turkey, found that most of the children enjoyed fun outdoor activities and games. Their understanding of science improved, and they became more curious and interested. The children developed an understanding of how science concepts are present in daily life. This made the learning more concrete for the children — they saw that science can be fun and that it is relevant outside school. The findings from the paper by Moffett (2011), which was based in Belfast, agreed with this. She outlined that the children in her study were more enthusiastic and motivated as a result of outdoor learning. This trail gave children the opportunity to apply their maths skills to real-life maths situations.

2. The use of iPads in outdoor learning

Several of the selected papers detail how apps on iPads can be used to enhance children's science learning outdoors. McClain and Zimmerman (2016) reported that when the app included prompts and questions that were specific to the location, children were

enabled to observe their surroundings on the nature trail. The study by Zimmerman et al. (2019) agrees with this and suggests that prompts and questions in apps help children to engage with sensory exploration. Research by Kahr-Højland (2011) states that without drawing learners' attention to meaningful resources, they could pass them by without noticing. Along with using an app on iPads, the children in the study by Zimmerman et al. (2019) used beacon transmitters. These were small devices placed at various locations, which transmitted signals to the iPads when children were within a set distance. Content and activities specific to that exact location were then available for the children to view on the iPad app.

Different features of an app can appeal to different children (Jung, Zimmerman and Land, 2019). Some of the children in the study were drawn to the photo activities while others were interested in the tree investigation activities on the app. They reported that a balance between open-ended activities and educator-designed activities on the app would be most beneficial for the children's engagement with nature. McClain and Zimmerman (2016) outlined that it can be challenging to introduce an app that enriches children's experiences outdoors without resulting in a dependency on the iPad. To overcome this challenge, the researchers suggest designing an app that promotes engagement with the natural surroundings using interactive widgets, photos and texts. The results from a later study by Zimmerman et al. (2019) showed that the children's sensory exploration was not hindered by using the iPads. The devices actually promoted peer discussion; this is reviewed in more detail in the following section.

3. Group work in outdoor learning

Many of the authors in this review wrote about the importance of group work in outdoor learning. Working with peers allows children to support each other in their learning while completing tasks outdoors (Jung, Zimmerman and Land, 2019). During outdoor maths lessons for students aged 13 in Sweden, there was a focus on communication and small-group problem solving. The outdoor maths lessons included playful and competitive team tasks, which enabled the children to discuss and argue with their peers using their knowledge of maths (Fägerstam and Samuelsson, 2014). Other selected papers reported on the social implications of group work during outdoor learning. When completing activities outdoors, increased interaction between groups of children had a positive impact on friendships (Tas and Gülen, 2019). However, conflicts also occurred when some children had different interests to the others in their group (Jung, Zimmerman and Land, 2019). In this study, adults didn't intervene to negotiate the dispute, and both groups who had experienced conflict finished the project successfully.

There are different ways in which peers can communicate during outdoor learning. Children can demonstrate their collaboration by pointing to a certain object to show their peers (McClain and Zimmerman, 2016). Another paper reported that using iPads during outdoor learning supported children to discuss their experiences in nature with their peers (Zimmerman et al., 2019). This study noted different kinds of sense-making talk among children depending on whether the activity involved observational or interpretive discussion. During a fruit identification task, children engaged in observational and descriptive talk with peers. The other task in this study involved learning about the local hydrogeological history; this task resulted in higher levels of interpretive discussion and analysis among peers. Both of the tasks described above involved multiple bodily movements such as pointing, walking, stomping, splashing and climbing in nature. The

analysis of this study shows that high levels of conceptual talk occurred while the children were engaging in these types of movements. The results suggest that these movements in nature may have prompted richer conversations between children (Zimmerman et al., 2019). This emphasises the point made in the previous section that using iPads doesn't create a dependency on the devices — it can promote important peer interactions and engagement with nature.

The importance of providing meaningful outdoor scientific experiences for children was outlined by Boaventura et al. (2013). This study, which was based in Portugal, reported that collaborative discussion among the class can help children to overcome difficulties and improve their understanding of the scientific process. This relates to the importance of collaboration and discussion revealed by the papers reviewed above, and to Vygotsky's theory of the zone of proximal development (ZPD). This theory describes how a learner can advance with the help of scaffolding and discussion with more knowledgeable peers and adults (Vygotsky, 1978).

4. Experiences in nature

The paper by Blatt and Patrick (2014) investigated pre-service teachers' past experiences in nature. They found that the majority (97%) of the teachers had childhood experiences playing outdoors in nature. The pre-service teachers reported that their positive experiences in nature helped their creativity, relaxation and learning. These experiences have had an influence on the value that they place on bringing their students outdoors.

The case study carried out by Eick (2012) discusses outdoor learning in science and the approach taken by a third-grade teacher in the United States. This teacher became interested in science through her own positive childhood experiences outdoors. She had strong beliefs in the importance of outdoor learning and felt the need for her students to learn science through outdoor experiences. The research by Jung, Zimmerman and Land (2019) showed that sensory experiences in nature can lead to emotional engagement. Some children enjoyed having tactile experiences with the trees, and this maintained their attention to the task. The researchers suggest that science-learning apps used on iPads need to integrate sensory and tactile experiences. These types of experiences in nature can encourage emotional engagement and help children to become interested in science.

Other research outlines the importance of engagement with nature because of the link between learning *about* the environment and learning to *care for* the environment. Martin (2007) suggests that pre-service teachers should have opportunities to participate in outdoor activities in order to feel a connection with nature. This will be discussed further in the next section. Many of the papers reviewed above discuss the relationship that children have with their natural surroundings. David Sobel (1996, p.39) described the importance of facilitating children to develop a caring relationship with nature; he said they should be allowed to 'love the earth before we ask them to save it'.

5. Training for teachers and challenges associated with outdoor learning

Some of these papers discuss the challenges faced by teachers regarding outdoor learning. To understand where these challenges begin, it is interesting to note student teachers' beliefs about outdoor learning. Subramaniam (2019) investigated student

teachers' conceptions of teaching life science outdoors. This study from the United States found that most teachers viewed teaching science outdoors as a teacher-directed process that takes place in the school yard. They did not connect outdoor science with in-class science learning.

The paper by Moffett (2011) found that when planning for outdoor learning, student teachers believed that bad weather would be their main challenge. They were also concerned about health and safety, lack of experience/knowledge, class size and time constraints. Kindergarten teachers in a Norwegian study by Skarstein and Ugelstad (2020) viewed working with science challenging; their main concerns were lack of knowledge and lack of equipment. The teachers in this paper by Skarstein and Ugelstad (2020) were interested in learning more so that they would feel confident in teaching science outdoors. The researchers conclude that teacher education programmes and professional development courses should provide teachers with the competences to teach science outdoors. It is also interesting to note the change in outlook among the student teachers in the paper by Moffett (2011) mentioned above. After completing their training, all of the student teachers reported that their confidence in facilitating outdoor learning had improved. After the training project, the main challenge reported was finding time to organise and conduct the maths trail. Adult-to-pupil ratio was not a problem because the student teachers worked in groups and there were also class teachers present. However, some teachers expressed concern about supervision if they were to do the trail again without other adults. From their research, Blatt and Patrick (2014) suggest that pre-service teachers should learn how to facilitate outdoor education as part of their training. This study also discusses the need for pre-service teachers to be taught how to integrate outdoor learning effectively. The paper by Eick (2012) gives an example of how outdoor education can be integrated effectively. He detailed how the teacher in his case study successfully linked outdoor learning to indoor lessons. Sometimes, outdoor learning is a more complex issue, as discussed in the paper by Tal and Morag (2013). They investigated how the culture around environmental education has changed in one school in Israel. They found that the environmental education programme isn't valued as much as it used to be, it's not aligned with the new curriculum, and there is now pressure from high-stake assessments. The staff involved in the programme have changed over the years, and the local community has also grown. The newer teachers are not as connected with the programme, and this causes tensions among the staff due to conflicting attitudes.

Other research agrees with the benefit of training student teachers on how to facilitate outdoor learning. Teachers are more likely to implement new methods when they have a chance to practise what they have learned (Darling-Hammond et al., 2009). An English study by Edwards-Jones, Waite and Passy (2018) outlined the need for teachers to develop their confidence to teach outdoors and the need for outdoor learning to be promoted by leaders. The challenges revealed in this paper agree with some mentioned earlier such as weather-, resource- and people-related issues. In addition to this, they found that policy-related issues were another obstacle to outdoor learning. Policy can be useful to direct teachers when they are implementing outdoor learning. However, there is currently a lack of policy in Ireland relating to outdoor learning. Some helpful guidance has been published by Education Scotland (2009), with practical advice for teachers. The Department for Education and Skills (DfES) (2006) in the UK have a 'Learning Outside the Classroom' manifesto to promote outdoor learning for all students.

Conclusion

The findings from this review demonstrate several effective approaches that teachers have used to facilitate maths and science lessons outdoors. The studies showed that outdoor lessons need to involve fun activities that are relevant to real life (Moffett, 2011; Tas and Gülen, 2019). Several of the papers indicate how iPads can be used in outdoor science lessons. Prompts and questions on the apps that are specific to the location can enrich the children's engagement and learning. (McClain and Zimmerman, 2016). This review outlines how teachers facilitate group work during outdoor lessons. Participating in outdoor problem-solving tasks in small groups provides children with a chance to communicate and collaborate with peers (Fägerstam and Samuelsson, 2014). It can be challenging to use apps that will enhance the children's learning outdoors without creating a dependency on the iPad. This challenge can be navigated by using a suitable app to promote engagement with the environment and discussion between peers (McClain and Zimmerman, 2016; Zimmerman et al., 2019). This review found that the main challenge associated with outdoor learning in maths and science is a lack of confidence and experience among teachers (Moffett, 2011; Skarstein and Ugelstad, 2020).

Limitations

The limitations of documentary research apply to this review as it relies on published literature. The comprehensiveness of the review is affected by the number of papers that can be included. Every effort has been made to include the most appropriate papers in the final twelve selected studies.

Implications for Research and Practice

There is limited literature on outdoor learning in maths and science in the Irish context; the gap in research in this area is a potential focus for future studies. Teachers in Ireland would benefit from policies and guidance in relation to outdoor learning. This review found that a lack of experience and confidence were the biggest challenges among teachers; therefore, increased training would be beneficial for overcoming this challenge.

References

Bentsen, P. and Jensen, F.S. (2012) 'The nature of Udeskole: outdoor learning theory and practice in Danish schools', *Journal of Adventure Education and Outdoor Learning*, 12(3), pp.199–219.

Blatt, E. and Patrick, P. (2014) 'An exploration of pre-service teachers' experiences in outdoor 'places' and intentions for teaching in the outdoors', *International Journal of Science Education,* 36(13), pp.2243–2264.

Boaventura, D., Faria, C., Chagas, I. and Galvão, C. (2013) 'Promoting science outdoor activities for elementary school children: contributions from a research laboratory', *International Journal of Science Education*, 35(5), pp.796–814.

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp.77–101.

Cooper, H. (1998) *Applied social research methods. Synthesizing research: a guide for literature reviews.* 3rd edn. New York: Sage Publications.

Courtney, S.A., Caniglia, J. and Singh, R. (2014) 'Investigating the impact of field trips on teachers' mathematical problem posing', *Journal of Experiential Education*, 37(2), pp.144–159.

Creswell, J.W. (2013) *Educational research: planning, conducting, and evaluating quantitative and qualitative research*. Boston, MA: Pearson Education Limited.

Darling-Hammond, L., Chung, R., Andree, A., Richardson, N. and Orphanos, S. (2009) *Professional learning in the learning profession — a status report on teacher development in the United States and abroad*. Dallas, TX: National Staff Development Council.

Davies, R. and Hamilton, P. (2018) 'Assessing learning in the early years' outdoor classroom: examining challenges in practice', *Education 3-13*, 46(1), pp.117–129.

Department for Education and Skills (DfES) (2006) *Learning outside the classroom manifesto.* [Online] Available at: https://www.lotc.org.uk/wp-content/uploads/2011/03/G1.-LOtC-Manifesto.pdf (Accessed: 24 May 2021).

Education Scotland (2009) *Outdoor learning: practical guidance, ideas and support for teachers and practitioners in Scotland.* [Online] Available at: https://education.gov.scot/improvement/Documents/hwb24-ol-support.pdf (Accessed: 24 May 2021).

Edwards-Jones, A., Waite, S. and Passy, R. (2018) 'Falling into LINE: school strategies for overcoming challenges associated with learning in natural environments (LINE)', *Education 3-13*, 46(1), pp.49–63.

Eick, C.J. (2012) 'Use of the outdoor classroom and nature-study to support science and literacy learning: a narrative case study of a third-grade classroom', *Journal of Science Teacher Education,* 23(7), pp.789–803.

Fägerstam, E. and Samuelsson, J. (2014) 'Learning arithmetic outdoors in junior high school — influence on performance and self-regulating skills', *International Journal of Primary, Elementary and Early Years Education,* 42(4), pp.419–431.

Finn, K.E., Yan, Z. and McInnis, K.J. (2018) 'Promoting physical activity and science learning in an outdoor education program', *Journal of Physical Education, Recreation and Dance*, 89(1), pp.35–39.

Green, M. and Rayner, M. (2020) 'School ground pedagogies for enriching children's outdoor learning', *Education 3-13*. [Online] Available at: https://doi.org/10.1080/03004279.2020.1846578 (Accessed: 09 December 2020).

Healthy Ireland and Department of Health (2020) *Be well.* Available at: https://www.gov.ie/en/publication/06de8b-be-well/#physical-activity-guidelines (Accessed: 09 December 2020).

Jung, Y.J., Zimmerman, H.T. and Land, S.M. (2019) 'Emerging and developing situational interest during children's tablet-mediated biology learning activities at a nature center', *Science Education,* 103, pp.900–922.

Kahn, M., McGeown, S.P. and Islam M.Z. (2019) '"There is no better way to study science than to collect and analyse data in your own yard": outdoor classrooms and primary school children in Bangladesh', *Children's Geographies,* 17(2), pp.217–230.

Kahr-Højland, A. (2011) 'Hands on, mobiles on: the use of a digital narrative as a scaffolding remedy in a classical science centre', *MedieKultur: Journal of Media and Communication Research*, 50, pp.66–83.

Lee, C.K. and Bailie, P.E. (2019) 'Nature-based education: using nature trails as a tool to promote inquiry-based science and math learning in young children', *Science Activities*, 56(4), pp.147–158.

Martin, P. (2007) 'Caring for the environment: challenges from notions of caring', *Australian Journal of Environmental Education*, 23, pp.57–64.

Maths Eyes (2020) *The maths eyes concept.* Available at: http://www.haveyougotmathseyes.com (Accessed: 12 December 2020).

Maths Week Ireland (2020) *Maths trail.* Available at: https://www.mathsweek.ie/2019/maths-trail/ (Accessed: 12 December 2020).

McClain, L.R. and Zimmerman, H.T. (2016) 'Technology-mediated engagement with nature: sensory and social engagement with the outdoors supported through an e-trailguide', *International Journal of Science Education, Part B,* 6(4), pp.385–399.

Moffett, P.V. (2011) 'Outdoor mathematics trails: an evaluation of one training partnership', *International Journal of Primary, Elementary and Early Years Education,* 39(3), pp.277–287.

National Council for Curriculum and Assessment (NCCA) (1999a) *Mathematics teacher guidelines.* [Online] Available at: https://www.curriculumonline.ie/getmedia/f4374e02-b6bd-4028-8e46-b2ba158c44e6/PSEC02-Maths_Guidelines.pdf (Accessed: 23 May 2021).

National Council for Curriculum and Assessment (NCCA) (1999b) *Science teacher guidelines*. [Online] Available at: https://www.curriculumonline.ie/getmedia/8afff1e2-e969-4f64-af35-937da5b0ad18/PSEC03c_Science_Guidelines.pdf (Accessed: 10 December 2020)

National Council for Curriculum and Assessment (NCCA) (2008) *Research report no. 10. Science in primary schools, phase 1.* [Online] Available at: https://ncca.ie/media/2413/science_in_primary_schools-phase_1.pdf (Accessed: 11 December 2020).

Ofsted (2008) *Learning outside the classroom: how far should you go?* [Online] Available at: http://webarchive.nationalarchives.gov.uk/20141124154759/http://www.ofsted.gov.uk/sites/default/files/documents/surveys-and-good-practice/l/Learning%20outside%20the%20classroom.pdf (Accessed: 11 December 2020).

Romar, J.E., Enqvist, I., Kulmala, J., Kallio, J. and Tammelin, T. (2019) 'Physical activity and sedentary behaviour during outdoor learning and traditional indoor school days among Finnish primary school students', *Journal of Adventure Education and Outdoor Learning*, 19(1), pp.28–42.

Sahrakhiz, S., Harring, M. and Witte, M.D. (2018) 'Learning opportunities in the outdoor school — empirical findings on outdoor school in Germany from the children's perspective', *Journal of Adventure Education and Outdoor Learning*, 18(3), pp.214–226.

Shume, T.J. and Blatt, E. (2019) 'A sociocultural investigation of pre service teachers' outdoor experiences and perceived obstacles to outdoor learning', *Environmental Education Research*, 25(9), pp.1347–1367.

Skarstein, T.H. and Ugelstad I.B. (2020) 'Outdoors as an arena for science learning and physical education in kindergarten', *European Early Childhood Education Research Journal,* 28(6), pp.923–938.

Sobel, D. (1996) *Beyond ecophobia. Reclaiming the heart in nature education*. Great Barrington, MA: Orion Society Nature Literacy Series.

Solomon, J., Duveen, J. and Hall, S. (1994) 'What's happened to biology investigations?' *Journal of Biological Education,* 28(4), pp.261–266.

Subramaniam, K. (2019) 'An exploratory study of student teachers' conceptions of teaching life science outdoors', *Journal of Biological Education,* 53(4), pp.399–411.

Tal, T. and Morag, O. (2013) 'A longitudinal study of environmental and outdoor education: a cultural change', *Journal of Research in Science Teaching*, 9, pp.1019–1046.

Tas, E. and Gülen, S. (2019) 'Analysis of the influence of outdoor education activities on seventh grade students', *Participatory Educational Research*, 6(2), pp.122–143.

Tight, M. (2019) *Documentary research in the social sciences.* London: Sage Publications.

Vygotsky, L.S. (1978) *Mind in society: the development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Waite, S. (2010) 'Losing our way? The downward path for outdoor learning for children aged 2–11 years', *Journal of Adventure Education and Outdoor Learning*, 10(2), pp.111–126.

Whittemore, R. and Knafl, K. (2005) 'The integrative review: updated methodology', *Journal of Advanced Nursing*, 52(5), pp.546–553.

Zimmerman, H.T., Land, S.M., Maggiore, C. and Millet, C. (2019) 'Supporting children's outdoor science learning with mobile computers: integrating learning on-the-move strategies with context-sensitive computing', *Learning, Media and Technology,* 44(4), pp.457–472.

An Integrative Literature Review Exploring the Use of Differing Socioeconomic Linguistic Codes as an Effective Differential Tool Aimed at Alleviating Socioeconomic Educational Inequality

Sarah Joyce

Biography

Sarah Joyce completed the Professional Master of Education (PME) in Post-Primary Education at Hibernia College in 2021. Prior to this, she graduated with a Bachelor of Arts (Hons) Degree in Modern Irish and History from University College Dublin and a Postgraduate Diploma in Law from Dublin Institute of Technology. Sarah recently completed her NQT year, teaching Gaeilge at a secondary school in Co. Wicklow. As a language teacher, she was drawn to language pedagogies and the teaching methodology of code-switching. This inspired her to conduct research on whether this teaching methodology could be applied to Bernstein's Linguistic Code Theory insofar as a teacher could use the codes of varying socioeconomic factions to differentiate for the classroom to achieve a more inclusive learning experience.

An Integrative Literature Review Exploring the Use of Differing Socioeconomic Linguistic Codes as an Effective Differential Tool Aimed at Alleviating Socioeconomic Educational Inequality, by Sarah Joyce

Research supervisor: Ger Looney

Abstract

Bernstein's linguistic code theory purports that differing linguistic styles develop in children in direct response to their socioeconomic backgrounds. Curricula and assessment methods that are tailored towards the elaborate linguistic style of higher socioeconomic demographics can result in an unequal access to education (Davies et al., 2004). This dissertation investigated the application of teaching methodologies to a socioeconomically diverse classroom context that differentiates for varying linguistic codes. The study found that the elaborate linguistic code can be treated as a specialised academic language and thus can be taught as a separate language. A significant pitfall identified relates to assimilation along with conflicting effects between the restricted code used at home and the academic code required for academic achievement. This impacts learner self-efficacy and students' sense of identity, especially those from low socioeconomic backgrounds.

Keywords: differentiation, socio-economic, linguistic code theory, educational inequality, literacy, social constructivism, inclusivity, integration, Bernstein, Bourdieu

Introduction and Background

The 2019 *Report on educational inequality & disadvantage and barriers to education* concluded that Ireland's educational system, in its current state, could be considered unequal and unfair in its provision of access and opportunity to people from varying socioeconomic backgrounds (Houses of the Oireachtas, 2019). Bernstein posits that linguistic styles can develop in accordance with social environments, and socioeconomic groups can be identified by their form of speech or linguistic code (Bernstein, 2003). This study explored how teachers might use linguistic codes to inform their teaching practice to differentiate for students and, ultimately, attempt on a larger scale to alleviate educational inequality in the Irish education system.

Bourdieu asserted that individuals can hold different forms of capital, namely social, economic, cultural and symbolic, all of which can be used to their advantage (Giddens, 2009). According to Bourdieu, cultural capital is obtained from the family environment. Through education, cultural capital can lead to symbolic capital in the form of degrees and, in turn, afford access to employment opportunities and stronger economic capital (Giddens, 2009). Bourdieu's theory of cultural reproduction then draws connections between socioeconomic background and symbolic capital in the form of education, knowledge and skills (Giddens, 2009).

Kohn (1963; 1983) observed that lower-class occupations require discipline, obedience and conformity, whereas middle-class occupations allow for more autonomy and

intellectual freedom. Kohn claims these differences are subconsciously taught from an early age in accordance with the social class we are born into (Davies et al., 2004). This indirect form of education continues in post-primary education in the guise of the hidden curriculum. According to Bowles and Gintis (1976), the hidden curriculum teaches students about discipline, hierarchy and regimentation through rules that students must adhere to throughout daily school structures (Clancy, 1995). This theory is supported by Illich (1973) who stated that students must comply with the accepted social order and learn their place within the social class hierarchy (Giddens, 1992).

Bourdieu (1974) noted that social class segregation was reinforced through the language used in the classroom (Grenfell, Taylor and Francis Group, 2014). This is supported by Bernstein who ascertained that the educational inequality of the hidden curriculum is actualised through language and linguistic codes. Bernstein (1975) states that the elaborate linguistic code used in schools clashes with the restricted linguistic code that lower-class students are familiar with (Davies et al., 2004). In this way, the academic culture of schooling is one in which students from lower-class backgrounds cannot fully assimilate. It can therefore be argued that children may develop different learning processes based on the language and linguistic codes they are exposed to despite having equal potential for learning (Bernstein, 2003).

Vygotsky's (1978) theory on social constructivism views learning as a social process wherein students rely on teachers to aid connections between the lesson content and their own prior learning (Pritchard and Woollard, 2010). The key element that determines linguistic codes and styles of verbal planning is socialisation (Bernstein, 2003). Bernstein (2003) describes literacy as a process of verbal planning where students draw from their existing linguistic codes to inform the ways in which they will construct language. Bernstein further expands this theory in postulating that changes to a person's social setting, which exposes them to different speech systems and linguistic codes, can potentially influence and change the way in which verbal planning is conducted (Bernstein, 2003). It is therefore possible to conclude that there exists a propensity in a person's psychology to adapt their inherent linguistic code and move between codes. Known as codeswitching, this movement between linguistic styles and varieties (Nguyen, 2015) can inform teaching methodologies in the classroom where teachers can move between the students' first language (L1) and the language being taught (L2) (Levine, 2011). Synergising connections between Vygotsky and Bernstein, through the application of social constructivist theory, opens opportunities for teachers to use elaborate and restricted codes to scaffold and further develop students' linguistic codes and support the movement between, as required. Bernstein's linguistic codes theory in the context of Bourdieu's work on capital and informed by Vygotsky's social-constructivist theory yielded the following research questions:

1. What is the reality and impact of cultural reproduction in Ireland today?
2. How can we identify and differentiate for differing linguistic codes?
3. Can social constructivism in the classroom alter the linguistic codes that socialisation in the home has created?

Methodology

The research design of this dissertation is documentary research. Documentary research refers to the analysis of documents that contain information relating to the topic being

studied (Ahmed, 2010). In documentary research, the literature review provides the data for the research, and the research findings are dependent on the researcher's data selection and interpretation (Cohen, Manion and Morrison, 2007, p.194). Documentary research design therefore enables the researcher to research and analyse a range of different views on their research area before synthesising them into their own findings. An interpretivist paradigm champions a subjective approach to social and educational research (Cohen, Manion and Morrison, 2011, p.7). While a positivist paradigm is based on the philosophical notion of realism, the interpretivist paradigm acknowledges the philosophical theory of idealism. According to this paradigm, the world is interpreted by different people in different ways, and it is this interpretation that ultimately constructs our social reality (Cohen, Manion and Morrison, 2011, p.8). An interpretivist paradigm finds connotations with a qualitative research methodology. Qualitative approaches are open ended in their nature and require the interpretation of the data by the researcher (Creswell, 2013). Qualitative research relies on the literature review component of the study but also considers the views and opinions of participants (Creswell, 2013). This dissertation uses a mixed-methodological approach and so adopts an interpretivist paradigm.

Integrative Literature Review

An integrative literature review (ILR) allows the researcher to use varying data sources and studies in their research (Hopia, Latvala and Liimatainen, 2016). The ILR method is defined as a literature review that includes both empirical and theoretical publications (Hopia, Latvala and Liimatainen, 2016). An ILR takes a broad overview of the research topic and allows for diverse research where the researcher can draw from a wide range of perspectives and approaches and use a systematic process to identify, analyse and synthesise all selected studies (Toronto and Remington, 2020). The process used in this dissertation is based on Cooper's theoretical framework (1998), which outlines five stages to guide review (Hopia, Latvala and Liimatainen, 2016). The five-stage integrative review process includes: (1) problem formulation, (2) data collection or literature search, (3) evaluation of data, (4) data analysis, and (5) interpretation and presentation of results (Russell, 2005).

Data Analysis

Cooper (1998) defines the ILR data analysis stage as separate data points that have been collected are reduced into a unified statement about the research problem (Russell, 2005). It is during this stage that the researcher engages with an analysis and integration of the data collected and consolidates this into a new perspective on the research topic (Toronto and Remington, 2020). Data must be extracted into matrices for analysis and consolidation to support integration (Toronto and Remington, 2020). The thematic analysis (TA) process, as outlined by Braun and Clarke (2006), was utilised for this stage in the process. Central to TA is the notion that all pieces of data collected are organised around larger and more abstract themes (Shank, Pringle and Brown, 2018). Articles were read and re-read several times to familiarise the researcher with the material, from which patterns or codes emerged and were noted. These codes were then collated into potential themes, and data relevant to each theme was gathered and recorded. Further review and analysis of the themes were conducted, as they related to the articles, and data was then gathered to ascertain the specifics of each theme to inform the overall story of the analysis (Braun and Clarke, 2006). A summary table was constructed to outline key elements of selecting the twelve articles, which comprises the

purpose of the study, the methodology and methods used, the sample of the study, and a summary of the findings.

Table 2: Summary of Selected Papers

	Authors	Purpose	Sample	Methodology	Findings and Summary
1	Archer, Francis, Miller, Taylor, Tereshchenko, Mazenod, Pepper and Travers (2018)	'Setting' can be a practice that facilitates social and cultural reproduction when viewed through Bourdieusian lens	Drawing on survey data from 12,178 (11/12-year-old) students and interviews and discussions with 33 students	Mixed-methods approach including survey, interview and discussion	Top-set students are most likely to come from advantaged socioeconomic backgrounds. Lower-set students are most likely to come from disadvantaged socioeconomic backgrounds. Those taught in mixed-attainment classes have notably improved employment outcomes.
2	Barnes, Oliveira and Dickinson (2019)	To investigate how teachers can holistically support the teaching of academic code, including vocabulary and beyond, to include complex syntax and conceptual knowledge	15 classrooms and teachers located in an urban area of the Southeast of the USA. Children were aged between 4 and 5 years of age and came from low-income homes.	Mixed methods; observation and analysis of videos and transcripts; corpus-based analysis and content-based analysis used to develop a coding system	Teachers used simplification, easification and sophistication to support students to develop and understand academic language skills, vocabulary and syntax. The study showed that at this early education level, emphasis is put on vocabulary over sentence structure and syntax and identifies a need for emphasis on sentence level support.
3	Barret (2017)	To examine a 'mixed' pedagogical practice in a USA urban classroom through the lens of Bernstein's theory of 'relations within' education to alleviate inequitable outcomes for students of varying socioeconomic backgrounds	Fifth-grade classroom of students aged 10-11 years	Qualitative case study based on analysis of 30 hours of observation in a fifth-grade classroom (USA)	Mixed pedagogical practice can be an effective method by which teachers can bridge the gap between school and community so as to make learning more accessible for learners. However, the weakened framing of elements can sometimes be merely 'apparent' to students as teachers ultimately are required to steer content, pace and practice to ensure learning is taking place and students are acquiring required knowledge.
4	Boyle and Charles (2012)	To investigate whether using a guided group teaching strategy in a school with very high levels of social deprivation offered insights into Bernstein's socio-linguistic code theory	5 Year One children as part of the guided group, with remainder of class working in three separate groups	Guided group teaching strategy in school with Ofsted (March 2009) report of 'high levels of social deprivation'; observations and interviews about teaching practice in school	The study showed that the teacher's pedagogy was dictated by his understanding that the students were linguistically deprived. Students were not given the opportunity to partake in dialogue to further develop skills. The teacher used 95% closed questions, and the assumption by the teacher that the children were only capable of being exposed to the 'restricted code' was evident from this.

5	Daddow (2016)	To examine the effectiveness of explicit teaching of academic linguistic codes at university level where students' own linguistic codes were used as tools in the learning process	78 university students of Social Work Theory and 75 university students of Introduction to Social Work	Mixed methods: questionnaires, focus groups, semi-structured interviews with educators involved in the study	Students responded well to the bridge between their own literacies and the academic code. Students felt this valorised their own linguistic and cultural codes, and some students developed an ability to 'code-switch' between vernacular and academic or disciplinary relevant language.
6	Mac Ruairc (2011)	To examine teaching practices where linguistic demands and expectations within the school environment create different implications and outcomes for middle-class children and working-class children as a result of their linguistic experiences	Two groups of 12-year-old children from contrasting socioeconomic groups over the period of one school year	Qualitative study based on a friendship focus group design	The data showed that students from working-class backgrounds had difficulty with the level of linguistic formality required in the school environment, which had a negative impact on their quality of learning. The study found that what is required to remedy this is a process of linguistic decoding.
7	Mac Ruairc (2011)	Qualitative study using friendship focus-group design, contrasting children from differing socioeconomic backgrounds and their use of and attitude towards language	53 children of 12 years of age from two working class schools and one middle-class school	Qualitative study using data collected from standardised assessments in reading; classroom and school-based observations; interviews with teachers, school principals, parents, community workers; and friendship focus group discussions with students	Meta-linguistic awareness was found within the children, and they used language as a 'style resource' to ascertain the social context. Awareness levels differ in children, and they were not equally proficient in terms of the codeswitching demands placed on them by the different codes used in different settings. Linguistic choices were deliberate and sometimes internationally in contrast to school expectations.
8	Manison Shore (2015)	Talking in class: a study of socioeconomic difference in the primary school classroom and an exploration of how teachers and schools can intervene to ensure inclusivity	Two classes from differing socioeconomic areas within the city of Bristol, England — two small groups of children from each class	Interviews with small groups of students from differing socioeconomic backgrounds/areas; pictorial prompts utilised to encourage dialogue	There was significant variance in vocabulary between the two groups. The children in the higher socioeconomic group had greater confidence and independence in their speech and were able to discuss abstract ideas. The children in the lower socioeconomic group had heavily punctuated speech and their vocabulary was directly linked to their experiences and colloquialisms. The children in the higher group also used colloquialisms but were able to

					move between this and Standard English.
9	McAvinue (2018)	To analyse the data provided by the Growing Up in Ireland survey in order to quantify the link between socioeconomic status and oral language competence and vocabulary in 3- and 5-year-old children and place this data in the international context via parallel analysis of UK data provided by the Millennium Cohort Study	GUI: cohort of children tested first when they were 9 months old and again when they were 3 and 5 years old, with sample sizes of 9,793 and 9,001 children respectively MCS: cohort of children tested at 9 months old and again at ages 3 and 5 years. Original sample size of 18,552; age 3 involved 15,590; and age 5 involved 15,246	Analysis of data collected through Growing Up in Ireland and Millennium Cohort Study (UK)	The results of the GUI analysis found a significant association between socioeconomic status and vocabulary, which was liner, small and declined in strength from the 3-year-old to the 5-year-old cohorts. This association was found to be stronger in the UK study and so concluded that the association between socioeconomic status and oral competency may be weaker in the Irish context than reported internationally.
10	Merga (2020)	To collect data from secondary school teachers working in mainstream Australian classrooms relating to their teaching of struggling literacy learners and the barriers they perceive	Australian secondary school English teachers; 315 complete surveys collected, 30% of which were teaching in rural areas and more than 60% were from a public schooling context	A mixed-methods approach was employed, with data collected from Australian secondary teachers using a survey tool that collected quantitative and qualitative data with closed and open questions.	Secondary teachers noted high levels of diversity as a barrier that students face and can be related to a negative impact on teachers' perception of time available to support students struggling with literacy learning. A focus on learning disabilities as requisites for literacy intervention and support can result in the barrier of socioeconomic, cultural and linguistic diversities being ignored.
11	Montt (2016)	To establish whether socioeconomically integrated schools are equally effective for advantaged and disadvantaged students	2009 OECD Programme of International Student Assessment (PISA), which surveyed more than 500,000 15-year-old students across 74 countries and economies	Mixed methods: PISA uses standardised maths, reading and science tests and measures parents' education, occupational status and home belongings; student interviews about learning habits, engagement and motivation; principal interviews on organisation of school; interviews with educational authorities to identify organisational	Attending a socioeconomically integrated school yields higher achievement for disadvantaged students but an equal achievement loss to advantaged students when compared with disadvantaged students attending disadvantaged schools and advantaged students attending advantaged schools. Integration tends to be most effective with larger class sizes and larger schools that promote interaction among students with diverse backgrounds. Pedagogical and organisational adjustments are necessary for socioeconomic integration to work.

				arrangements at system level	
12	Sutherland (2015)	To investigate and establish, using a Vygotskian approach, which contexts and conditions make it possible for students to develop dialogic talk in small groups	Four teachers and 110 Year 8 (13–14-year-old) students in urban secondary schools and one university teacher-educator: groups of 4–5 students were created; groups were non-friendship, mixed-sex, mixed-ability and stable	Qualitative, interpretative methodology; analysis of group talk, observation, interviews and reflection; the research study lasted one academic year and data was collected from October 2007–June 2008.	Practising a structured model and implementing formative reflection on discourse had a positive effect on the majority of students. They were able to experiment with different forms of dialogic talk and identities. A change in confidence, discourse and identity positioning was most notably identified in 'lower-attainting' students from lower socioeconomic backgrounds. There was also a change in teacher-student relationships in classroom talk.

Findings and Discussion

Findings from the ILR reflect the Department of Education and Science (DES) (2005) view, which asserts that developed literacy skills are required for educational success and that students with low levels of literacy are more likely to leave the education system without qualifications. The 2004 European Research Council (ERC) report *Reading literacy in disadvantaged primary schools* found the proportion of pupils with serious literacy difficulties in disadvantaged schools was approximately three times the national average (DES, 2005). In the case of Ireland, the work of Mac Ruairc (2011) provides evidence that students from low socioeconomic backgrounds, particularly males, view their own linguistic capital as undervalued within the school environment, resulting in their rejection of academic language and, sometimes, of education itself. Here, we can see the propensity for cultural reproduction resulting from linguistic differences and socioeconomic educational inequality. It is interesting to note, however, that a recent study (Molloy, Murtagh and McAvinue, 2016) concerning Junior Infant students has shown that while there is a discrepancy in the range of vocabulary students from low socioeconomic backgrounds have in comparison more advantaged peers, it was small in magnitude and not statistically significant (Molloy, Murtagh and McAvinue, 2016). The variance weakens from the ages of 3 years to 5 years following early education (McAvinue, 2019).

The findings of this study point to the benefits of a socioeconomically integrated education in addressing and challenging educational inequality and cultural reproduction. However, international research (PISA 2009) shows that integrated education can result in reduced attainment for students attending advantaged schools (Montt, 2016). In the case of Ireland, however, research illustrates benefits from the integration for students from both lower and higher socioeconomic demographics (Montt, 2016). The manner in which schools are integrated was also highlighted in the chosen studies. Daddow (2016) supported a differentiated approach rather than an assimilated one. An assimilationist approach requires students to adopt the academic language in substitution to their own linguistic code rather than using the cultural proclivities of the students to inform the teaching and learning process (Daddow, 2016). Differentiated pedagogy is centred on the premise that teachers meet each student at their own individual level to ensure successful learning takes place for all (Levy, 2008).

The elaborate academic code associated with education can be viewed as a specialised language (Mac Ruairc, 2011), which needs to be taught to all students if they are to achieve educational success. Several studies identified varying approaches to differentiated pedagogy as they relate to the teaching of the academic code in the classroom. One approach identified was the explicit teaching of the language (Daddow, 2016), which involves the explicit teaching of the academic code, focusing on vocabulary, syntax and grammatical structures (Barnes, Oliveira and Dickinson, 2019). Other studies, such as Sutherland (2015) and Boyle and Charles (2012), adopted a dialogical approach to teaching language. Shared reading, which may be viewed as a social-constructivist methodology, was also offered as a potential teaching methodology for teaching language (Barnes, Oliveira and Dickinson, 2019). Shared reading introduces students to the written academic text but also to the oral language through extratextual talk, i.e. shared reading of written academic text guided by the teacher (Barnes, Oliveira and Dickinson, 2019). The extratextual talk used by the teacher is of particular benefit to students from a low socioeconomic background as it provides additional support for both vocabulary and syntax development (Barnes, Oliveira and Dickinson, 2019). Finally, a combination of the three methods — simplification, sophistication and easification — was found to facilitate shared construction of meaning in language (Barnes, Oliveira and Dickinson, 2019). Simplification and sophistication involve the manipulation of content up or down in order to meet the linguistic ability of the student while easification is a method that supports construction of meaning through the provision of conceptual context (Barnes, Oliveira and Dickinson, 2019).

Oral academic language skills can also be developed by adopting a dialogical teaching methodology (Boyle and Charles, 2012; Sutherland 2015). Sutherland researched students in groups of mixed ability and demographic factors, with the focus on peer collaboration and self-learning. Teachers did not intervene in the metadiscoursal process but still maintained control over learning expectations, reflection and formative feedback (Sutherland, 2015). It could be argued that this approach could offer a proactive step towards addressing what Mac Ruairc identifies as the exclusion students from low socioeconomic backgrounds feel arising from learning experiences that disconnect with their own linguistic style at school. Sutherland's approach proved effective in that students from all backgrounds demonstrated an understanding of the linguistic nuances associated with academic vocabulary and discourse following the research. It should be noted that in the case of Boyle and Charles (2012), the social-constructivist dialogical methodology was not found to be successful. It was found that teachers' awareness of students' socioeconomic backgrounds led to presumptions about the linguistic abilities of the students and intervening in the student dialogue in such a way that limited rather than enhanced their learning (Boyle and Charles, 2012).

The researcher has come to understand, critically, the distinction between integration and assimilation and the impact that the imposition of an elaborate linguistic code can have on the self-efficacy and sense of identity of students with a restricted linguistic code (Mac Ruairc, 2011). Findings show that the effective implementation of pedagogies for academic language is dependent on acknowledgment of the differing linguistic styles and identities within the classroom. As a newly qualified teacher (NQT), the research has influenced the researcher to approach the concept of academic language in a holistic and sociocultural manner. As linguistic style is a form of cultural capital (Giddens, 2003)

where students are inherently aware of the hierarchal structure of linguistic codes (Mac Ruairc, 2011), this study has informed the researcher of the importance of teaching the elaborate academic code and the ability to codeswitch, where required, in a manner that still respects and validates the linguistic codes of all students in the classroom. This research study has provided the researcher with insights into various perspectives, including those of student and teacher, which the researcher will apply to their future practice to ensure inclusion and differentiation in the classroom. The impact of this study has resulted in a more informed pedagogy for academic language acquisition and an increased insight into socioeconomic differentiation and integration. The pedagogic approaches explored range from explicit instruction in vocabulary and grammar to broader approaches to language and literacy encompassing oral language and dialogical discourse. As a NQT, such understandings of literacy as the ability to read, write, comprehend and critically assess various forms of communication, including speech (DES, 2017), will inform future practice so as to approach academic language as not only a written language but also as a spoken one.

Many studies to date (Giddens, 1992; Lodge and Lynch, 2002; Archer et al., 2018; McAvinue, 2018) have addressed how cultural reproduction begins with academic language acquisition in early education. However, the researcher has identified a lack of research beyond early education and primary school years. Further studies of children's language skills are necessary at post-primary and third level to establish whether the attainment gap widens or narrows throughout the education system (McAvinue, 2018).

Conclusion

A students' socioeconomic background has been described as the single most significant factor for educational success (Drudy, 2009). Students with low socioeconomic status are consistently linked with poor educational achievement (Cox, 2000), which can have intergenerational effects on families and communities (Department of Education and Science, 2005). Bernstein (1990; 1996) purports that this educational inequality is actualised through linguistic codes, with the elaborate linguistic code used in schools conflicting with the restricted linguistic code familiar to lower-class students (Davies et al., 2004). It is possible for the school environment to counteract outside influences on academic achievement (Giddens, 1992). This study considered how pedagogies based on the social constructivist theory could be applied to teach the elaborate code associated with academic success and offset the restricted code manifested through socialisation outside of school. The impact of socioeconomic integration and assimilation on students, teachers and the teaching and learning process was highlighted across several studies. Various pedagogical approaches range from the explicit teaching of vocabulary and syntax to socially constructivist dialogic strategies. The significance of the link between linguistic styles and identity and a sense of self was evident across numerous sources (MacRuairc, 2011; Sutherland, 2015; Molly, Murtagh and McAvinue, 2016; Manison Shore, 2020). Consequently, the impact that self-efficacy and belonging can have on a student's academic success was found to be significant. Overall, this study provided an insight into the effects that the conflict between the restricted code used at home and the academic code required for educational success can have on a student's self-efficacy, sense of identity and confidence (especially in those from low socioeconomic

backgrounds). It also identified a lack of research on the link between linguistic codes and academic achievement beyond primary school level in Ireland.

References

Ahmed, J.U. (2010) 'Documentary research method: new dimensions', *Indus Journal of Management and Social Sciences,* (4)1, pp.1–14.

Archer, L., Francis, B., Miller, S., Taylor B., Tereshchenko, A., Mazenod, A., Pepper, D. and Travers, M. (2018) 'The symbolic violence of setting: a Bourdieusian analysis of mixed methods data on secondary students' views about setting', *British Educational Research Journal*, 44(1), pp.119–140.

Barnes, E.M., Oliveira, A.W. and Dickinson, D.K. (2019) 'Teacher accommodation of academic language during head start pre-kindergarten read-alouds', *Journal of Education for Students Placed at Risk (JESPAR),* 24(4), pp.369–393.

Bernstein, B. (2003) *Theoretical studies towards a sociology of language*. Taylor & Francis Group.

Boyle, B. and Charles, M. (2012) 'David, Mr Bear and Bernstein: searching for an equitable pedagogy through guided group work', *The Curriculum Journal,* 23(1), pp.117–133.

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology,* 3(2), pp.77–101.

Clancy, P., Drudy, S., Lynch, K. and O'Dowd, L. (eds.) (1995) *Irish society: sociological perspectives.* Dublin: Institute of Public Administration.

Cohen, L., Manion, L. and Morrison, K. (2007) *Research methods in education*. Taylor & Francis Group.

Cohen, L., Manion, L. and Morrison, K. (2011) *Research methods in education*. Taylor & Francis Group.

Creswell, J. (2013) *Educational research: planning, conducting, and evaluating quantitative and qualitative research.* Pearson Education.

Cox, T. (2000) *Combating educational disadvantage: meeting the needs of vulnerable children.* London: Falmer Press.

Daddow, A. (2016) 'Curricula and pedagogic potentials when educating diverse students in higher education: students *funds of knowledge* as a bridge to disciplinary learning', *Teaching in Higher Education,* 21(7), pp.741–758.

Davies, B., Morais, A. and Muller, J. (2004) *Reading Bernstein, researching Bernstein*. Routledge.

Giddens, A. (1992) *Sociology.* London: Polity Press.

Giddens, A. (2009) *Sociology*. Cambridge: Polity Press.

Grenfell, M.J., Taylor and Francis Group (ed.) (2014) *Pierre Bourdieu: key concepts*. Acumen.

Hopia, H., Latvala, E. and Liimatainen, L. (2016) 'Reviewing the methodology of an integrative review', *Scandinavian Journal of Caring Science,* 30(4), pp.662–669.

Houses of the Oireachtas Joint Committee on Education and Skills (2019) *Report on educational inequality & disadvantage and barriers to education*. [Online] Available at: https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_education_and_skills/reports/2019/2019-06-05_report-on-education-inequality-disadvantage-and-barriers-to-education_en.pdf (Accessed: 04 November 2020).

Levine, G.S. (2011) *Code choice in the language classroom.* Bristol, New York and Ontario: Multilingual Matters.

Levy, H.M. (2008) 'Meeting the needs of all students through differentiated instruction: helping every child reach and exceed standards, the clearing house', *A Journal of Educational Strategies*, 81(4), pp.161–164.

Mac Ruairc, G. (2011) 'Where worlds collide: social class, schools and linguistic discontinuity', *British Journal of Sociology of Education,* 32(4), pp.541–561.

Mac Ruairc, G. (2011) 'They're my words — I'll talk how I like! Examining social class and linguistic practice among primary school children', *Language and Education,* 25(6), pp.535–559.

McAvinue, L.P. (2018) 'Oral language and socioeconomic status: the Irish context', *Irish Educational Studies,* 37(4), pp.475–503.

Molloy, G., Murtagh, L. and McAvinue, L. (2016) 'An examination of oral language competence of Junior Infant pupils attending DEIS and non-DEIS schools', *Irish Educational Studies,* 35(2), pp.213–231.

Montt, G. (2016) 'Are socioeconomically integrated schools equally effective for advantaged and disadvantaged students?', *Comparative Education Review,* 60(4), pp.806–823.

Nguyen, T. (2015) *Code switching: a sociolinguistic perspective.* Hamburg: Anchor.

Pritchard, A. and Woollard, J. (2010) *Psychology for the classroom: constructivism and social learning*. New York and London: Routledge.

Russell, C.L. (2005) 'An overview of the integrative research review', *Progress in Transplantation,* 15(1), pp.8–13.

Shank, G., Pringle, J. and Brown, L. (2018) *Understanding education research: a guide to critical thinking.* New York and London: Routledge.

Sutherland, J.C. (2015) 'Going "meta": using a metadiscoursal approach to develop secondary students' dialogic talk in small groups', *Research Papers in Education,* 30(1), pp.44–69.

Toronto, C.E. and Remington, R. (eds.) (2020) *A step-by-step guide to conducting an integrative literature review.* Switzerland: Springer.

Effectively Incorporating Numeracy in the Classroom Using Universal Design for Learning Principles

Áine Murphy

Biography

Áine Murphy graduated with a Bachelor of Arts (Hons) Degree in Finance and Accounting from Maynooth University and went on to qualify as an accountant with the Association of Chartered Certified Accountants. She has worked in both practice and industry, and it is through this experience that she initially realised the importance for all people to acquire basic numeracy skills to participate fully in society. Áine completed the Professional Master of Education in Post-Primary Education in 2022, achieving First-Class Honours as well as receiving the Research Award for her cohort. Through her school placement experiences, her passion to instil basic numeracy skills in her students was established. She hopes to continue this throughout her teaching career.

Effectively Incorporating Numeracy in the Classroom Using Universal Design for Learning Principles, by Áine Murphy

Research Supervisor: Aoife Prendergast

Abstract

Effectively incorporating numeracy into the classroom is an important practice for teachers. Numeracy can be supported by utilising a range of resources that include real-life contexts and digital technology (DT). Universal Design for Learning (UDL) enables spaces for the effective incorporation of numeracy using DT as a tool in assisting this approach. This Integrative Literature Review (ILR) explored specific methods of effectively incorporating numeracy in the classroom and focused on UDL as an overarching method. The ILR addressed challenges posed in this approach and identified areas to overcome them. Through thematic analysis, two central themes were determined and discussed with reference to wider literature and in light of the policies currently established in the Irish context.

Keywords: Universal Design for Learning, numeracy, digital technology, real-life contexts

Introduction and Background

Informed by the researcher's school placement experiences, it was clear that a number of students were experiencing difficulties with basic numeracy skills. Through researching the area, it is clear that even though there has been a national focus on literacy and numeracy, reflected in the 2011 *Literacy and numeracy for learning and life* strategy (Department of Education and Skills (DES)) and through the School Self-Evaluation (SSE) process established in 2016, the acquirement of these basic skills is an ongoing problem in Irish schools. This challenge permeated the aim of the thesis in seeking to explore effective strategies to address numeracy difficulties when teaching Business-based subjects as it would be pertinent to the researcher's own professional development in lesson planning as an inclusive means of differentiating in the classroom. Numeracy is a skill that is established in early years at home and is fostered throughout a child's educational progression. Numeracy forms the basis of the *Mathematics in early childhood and primary education (3–8 years)* report from the National Council for Curriculum and Assessment (NCCA) (Dunphy et al., 2014, p.10) where 'a growing awareness of the importance of mathematics in the lives of individuals, in the economy and in society' is discussed. The *Literacy and numeracy for learning and life* report (2011) recognises that improving numeracy outcomes is important for a person to participate fully in society. The policy identifies a number of key areas, which include teachers' professional development (PD), the curriculum itself and the role of parents and guardians in supporting children.

The reform of the Junior Cycle in 2014 included the introduction of key skills set out by the NCCA that clearly identifies numeracy as a necessary skill that requires focus and development. The Junior Cycle Framework published by the DES (2015) builds on Vygotsky's (1978) social constructivist theory, whereby active teaching methodologies such as groupwork form a vital element. Such active pedagogies provide learners with

opportunities to work with and learn from each other, that which aspires to enact the Zone of Proximal Development. Active teaching methodologies also provide a means of differentiating for students with special educational needs by giving a teacher the opportunity to introduce engaging methods in delivering content and assessing student understandings and learning. The Senior Cycle Key Skills Framework (2009) does not exclusively state the word 'numeracy' in their list of key skills, but it is implied when mentioning information processing, critical and creative thinking, being personally effective, and communicating.

The Professional Development Service for Teachers (PDST, 2016) published *An integrated approach to teaching and learning*, which details how numeracy and differentiation can be incorporated into lessons as well as literacy, working with others, inquiry-based learning and ongoing assessment, all of which are elements in effective teaching. Effective teaching has many definitions. For the purposes of this article, the term adheres to that which Ko, Sammons and Bakkum (2013) discussed as something that can improve students' learning outcomes. The PDST (no date) also published *Differentiation in action*, which outlines effective teaching strategies that teachers can embed into their lesson planning to help differentiate for diverse learners.

The School Self-Evaluation process (2016) was established by the DES to help schools plan and develop for the improvement of learning outcomes for students. As one of the objectives, schools are required to concentrate on numeracy outcomes. The SSE process promotes the practice of setting targets and assigning roles to teachers to enact action and to evaluate whether such actions work. Plans are adapted so that optimum results can be obtained. Teachers are provided with the opportunity to collaborate with each other on how best to incorporate and/or improve numeracy in the classroom. Cooper, Klinger and McAdie (2017) found that although continuous PD and the use of evidence-informed practices were important, collaborating with colleagues and implementing consistent practices in a school setting were key. In this regard, the SSE process advocates the idea of numeracy to be differentiated as an effective teaching method across all subjects through collaboration.

Although the said policies do not directly mention a UDL approach, they are certainly a means of differentiating for effectively teaching students inclusively. The *Digital strategy for schools 2015–2020* and the newly published *Digital strategy for schools to 2027* were initiated to provide guidelines to schools on how to embed digital technology (DT) into teaching and learning. These strategies have a focus on providing opportunities for all learners by helping to support teachers in delivering inclusive modern teaching practices conducive to UDL principles. The value of a UDL approach has yet to be formally recognised through Irish educational policies, but it is possible through further research and practice to forefront such innovative standards. The researcher developed the following research questions based on their initial exploration of policies in the area of research interest, which encompass the topics of numeracy and UDL:

1. How do teachers effectively incorporate numeracy in their classrooms?
2. What are the challenges in using Universal Design for Learning when trying to effectively incorporate numeracy in their classrooms and how to overcome these challenges?

Methodology

An Integrative Literature Review (ILR) was the methodological approach undertaken for this dissertation. Literature from different sources in relation to effective and inclusive teaching methods was examined and utilised, allowing a synopsis of the findings to be identified and critically evaluated. Although Hopia, Latvala and Liimatainen's (2016) research was in relation to the nursing sector, their conclusions are steadfast that an ILR can help develop evidence-informed practices. Using the steps outlined by Jesson, Matheson and Lacey (2011), which include using libraries and the internet to search for relevant literature, is integral to the research process of presenting and critically analysing data researched whilst ensuring that all documents are carefully selected and referenced. Following these steps, the researcher engaged with thematic analysis (TA) to address the identified research questions and name themes to inform future practice and pedagogy.

Integrative Literature Review (ILR) Approach

The impact of the COVID-19 pandemic left it difficult for researchers to conduct primary research, so a documentary research design was recommended to carry out and complete this dissertation. An Integrative Literature Review (ILR) follows a certain procedure, encompassing both empirical and theoretical studies and resulting in a more holistic understanding of the research questions in hand as a range of diverse sources can be used (Hopia, Latvala and Liimatainen, 2016). Whittemore and Knafl (2005) devised a framework in relation to the method used in completing an ILR, which attempts to improve the rigour of the approach. The framework provides a step-by-step approach to be followed, which includes: 1) problem formulation, 2) literature search, 3) data evaluation, 4) data analysis, and 5) presentation. Whittemore (2008) extensively discusses the robustness of ILRs. Their approach details the combination of qualitative and quantitative characteristics that invoke the rigorousness of an ILR. The critical appraisal of each paper, whether selected or not, through the use of the established criteria is similarly robust. Such criteria included the publication timeframe, whether or not it was a primary study and if the paper was peer reviewed — papers were initially included or excluded based on this. The process of inclusion or exclusion thereafter took account of the sample size, context of the paper, and the educational sector and perspective it was written from. While undertaking this ILR, the researcher was cognisant of bias and endeavoured to remain objective through constant reflection at each stage of the process.

Data Analysis

By using the criterion used as part of the data evaluation as a basis for further analysis, the researcher commenced a methodical approach to synthesise the twelve papers informed by the research questions. The articles were read repeatedly, and the researcher followed Braun and Clarke's (2006) model to become as familiar as possible with each paper to enable patterns to emerge and themes to be identified as part of the cross-examination process. When assessing the rigour of the review, critical appraisal using specific criteria was mentioned as encouraged by Whittemore (2008). This criteria incorporated ethical characteristics of each paper, including the participants involved, the context and the composition of the sampling. As no primary data was collected, anonymity, confidentiality and other ethical issues were upheld. The use of specific

selection criteria and the comprehensive and iterative evaluation and analysis process that examined the thematic differences in the papers enabled bias to be prevented (Braun and Clarke, 2006). Table 1 presents a summary of the selected papers, including authors, purpose, sample, methodology and the findings/summary of each study.

Table 1: Summary of Selected Papers

	Authors	Purpose	Sample	Methodology	Findings/Summary
1	Geiger, Goos and Dole (2015)	The influence of integrating digital technologies into the teaching and learning of numeracy	A school-based project across one Australian State over a period of 1 year; 10 pairs of middle school or secondary teachers	A qualitative approach incorporating action research, immersion experiences, curriculum implementation and collaborative partnerships between teachers and university researchers. Data drawn from field notes of observations, audio recordings of semi-structured interviews and collection of artefacts	The project is presented using a vignette to demonstrate the integration of digital tools into teaching and learning and how this can enhance numeracy in the classroom.
2	Handal, Novak, Watson, Maber, MacNish and Eddles-Hirsch (2014)	The effective use of mobile devices, i.e. iPad applications, to enhance the learning and outcomes of numeracy as part of different subject curriculum areas	8 primary school teachers participated in 3 whole-day professional development workshops	Qualitative approach analysing the professional development of the teachers and their reflections on their experiences and classroom practices	Teachers developed their skills in relation to designing pedagogical wraps for their subject areas and improved their overall knowledge in relation to the role of apps in numeracy education.

3	Cull and Travers (2018)	Inclusively enhancing the numeracy skills of primary school pupils through a co-teaching model of early intervention	3 adults with teaching experience ranging from 8 to 15 years working with 22 students in a multi-grade First and Second primary school class	Mixed-methods approach analysing the research study conducted and measuring the improvement in the students' numeracy performance	Assessment tasks ascertained those students maintained and improved their numeracy knowledge through the co-teaching model and helped the teachers to identify the strengths and needs of the pupils in the class in the area of numeracy.
4	Bleach (2015)	A learning community implementing a course supporting and developing children's numeracy learning through various developmentally suitable and challenging mathematical experiences	A group of 16 local ECCE services and primary schools, led by Early Learning Initiative, took part in the Early Numeracy Programme, which supported 860 children and their families each year over a 3-year period.	Qualitative approach evaluating the action research carried out through reflective working group meetings and discussions and measuring the impact on the children's numeracy outcomes	With the use of training workshops for both early childhood care and education practitioners and numeracy workshops for parents as well as on-site mentoring visits, there was a positive impact on the children's numeracy outcomes and an improvement to the quality of the work carried out by educators in addition to the increased awareness of parents in relation to the concept of numeracy.
5	Hall and Slaney (2017)	Identifying effective approaches for helping students to improve numeracy skills for success in their further education courses	2 further education teachers over a period of several academic years in a range of courses	Qualitative approach using questionnaire surveys, interviews, and observations	Numeracy skills, e.g. as critical thinking and problem solving, improved amongst students of further education after the integration of numeracy into courses using realistic vocational activities to motivate students

6	Stassen and Baumgart (2014)	Developing quality pedagogies for teaching numeracy, specifically to improve outcomes for indigenous students, and incorporating effective differentiation in the teaching and learning processes	10 middle school Mathematics teachers, 2 learning support teachers and 10 indigenous middle school students	Qualitative approach using surveys for both teachers and students and reflective exercises. Selective interviews were also used.	Professional development of teachers aided them in being able to differentiate more successfully in the classroom, not just for the indigenous students but overall. Making mathematics personally meaningful for students had a positive impact. The direct instruction yielded improved results, but there were still concerns in relation to this teaching style.
7	Dinmore and Stokes (2015)	Creating inclusive university curriculum for diverse cohorts of students with the use of a combination of a team-based approach along with the effective use of technology-enhanced learning	University teaching faculty of the Information Skills course along with 300 participating students in total, including 210 on city campus, 50 on regional campus and 40 wholly online	Mixed-methods approach used to measure student satisfaction and success as well as reflections on teaching practices	Professional development is needed to ensure educators are aware of how to implement UDL. Collaboration among faculties also enables the successful integration of UDL. Student success and satisfaction improve as a result of the inclusive nature of UDL when implemented successfully. Reflection of practices helps with continuous further improvement.
8	Woods and Leahy (2019)	Using digital technologies to support inclusion and as means of providing multiple means of representation and expression in the classroom	1 graduate student teacher	Qualitative approach to analysing and interpreting the collected data as part of an action research project	Reflecting on current practices by thematically analysing the methods employed previously enabled the educator to redesign future practices to incorporate digital technologies and multiple means of representation and expression for students' learning experiences to improve and to improve on the inclusivity of the lessons overall.

9	Westine, Oyarzun, Ahlgrim-Delzell, Casto, Okraski, Park, Person and Steele (2019)	Investigates the understanding of online faculty regarding UDL guidelines and what their current knowledge is and how it can be improved	355 university employees who were part of the online faculty from the years 2017 to 2018 at a large university in the United States	Mixed-methods approach used in analysing questionnaires carried out, with the questions aligning to 3 distinct research questions	Although educators are aware of elements of UDL and have an understanding of the benefits of UDL with some elements already being incorporated into their online teaching, there is a need to improve on and build on this understanding and to accommodate educators with effective training in the application of UDL.
10	Diaz-Vega, Moreno-Rodriguez and Lopez-Bastias (2020)	Analyses the level of knowledge and implementation of the principles and strategies of UDL by university professors and how it might be improved	255 professors responded to a questionnaire out of 342 who had received the specific report discussed	Mixed-methods approach discussing, analysing and measuring the results of the questionnaire	Professors showed a lack of knowledge in relation to UDL; however, a high level of implementation of the underlying principles described were noted regardless. There is a need for students to be given alternative means of expressing their knowledge without changing the lesson or unit's objectives. In order for educators to become better informed, teacher training must be provided.
11	Evmenova (2018)	Investigating the benefit of educators taking part in an online course designed using UDL principles where they learned about UDL implementation itself	70 educators including in-service general and special education teachers	Mixed-methods study exploring the results of educators taking part in an online UDL-designed course through reflective discussions, educators' observations of lessons and surveys	A positive impact was made by modelling UDL principles through an online course, which demonstrated to educators how to implement UDL in the classroom and the advantages of using technology in the process. Teachers could successfully embed strategies in their own lessons and reflect on their success. Educators could address any issues that arose within their contexts, heightening their understanding of the principles of UDL.

12	Owiny, Hollingshead, Barrio and Stoneman (2019)	Researching the perceptions of pre-service teachers of inclusive classrooms before and after instruction on UDL and observing the difference this instruction had on their lesson planning	14 pre-service teachers admitted to the teacher education programme with initial licensure in the elementary or secondary grade level	Mixed-methods study analysing and measuring perceptions and lesson planning pre and post instruction on UDL with the use of surveys and observing lesson plans themselves	There was a positive impact on lesson plan design after undergoing UDL training. After training, it was clear that teachers had gained knowledge in the area, but it was also demonstrated from the results that further training and modelling is needed to continue to develop their skills.

Findings and Discussion

After an examination of selected papers that explicitly focus on different aspects of numeracy education, it was noted that many of the studies mentioned the relevance of real-life contexts being used when teaching numeracy across the curriculum. When defining numeracy, Cockroft (1982), DES (2011), OECD (2016) and AAMT (1998) all include the idea of the skill to enable spaces for people to take part in society by applying their numerical knowledge to real-life situations. This corresponds with the findings of the studies where the use of real-life contexts when incorporating numeracy into learning have proven to be a beneficial methodology in improving student numeracy outcomes. Ko, Sammons and Bakkum (2013) suggest results are achieved when such effective teaching takes place. Parsons and Bynner (1997) voice concerns, however, in relation to the deterioration of numeracy skills in the workplace. This goal of improving numeracy skills is in line with evidence-based real-life contexts and when working from a top-down perspective where the application of numeracy is the starting point and learning experiences are developed as a result (Hall and Slaney, 2017).

Gardner's (2011) research into different learning styles that cater for different intelligences coincides with the idea of using DT as a method of providing enriching student learning experiences. Geiger, Goos and Dole (2015) further demonstrate such diversity in learning wherein the representation of data was available to students using DT. Fosnot (1996) expresses the need for considering students' socio-economic backgrounds in relation to DT. This is also relevant as educators need to be aware of whether students have access to these digital tools when creating units of learning. The same study explores the need to consider students' cultural backgrounds, which is also applicable to ensuring that real-life contexts are inclusively applied when developing lesson plans. A student's self-efficacy as relative to their learning outcomes was examined by Peters et al. (2019) and correlates with findings observed in a number of the selected papers where it was apparent that there was a positive link between a students' self-efficacy and their level of motivation and engagement, leading to improved outcomes. The PDST also advocates the process of getting to know what motivates students along with an awareness of their socio-economic and cultural backgrounds, but it is a difficult task to complete considering the number of students a post-primary teacher may have in their classroom over the course of a school week. Such knowledge is built over the course of a student's time in education. Collaboration with other teachers may prove beneficial here. This was reflected in the findings as an important

factor for not only getting to know students but also in relation to discussing effective pedagogies, as promoted by Cooper, Klinger and McAdie (2017) and the DES (2016) as part of the SSE process where cross-curricular collaboration is considered as a means of capacity building for effective teaching strategies.

Many of the reviews studied identified DT as an enhancing means of incorporating UDL in the classroom. The principles of implementing UDL, as established by CAST (2018), include multiple means of engagement, action and expression, and representation. Evidence presented in the findings detail how the use of DT as part of a UDL framework is conducted and used. Enhanced learning outcomes and student satisfaction levels were apparent in the studies. Giving students equal opportunities to learn, as promoted by AHEAD (2017), is enabled with the use of DT as there are various means of accessing, presenting and using information. Pischa and Coyne (2001) pertain that a realisation of the needs of the greatest amount of people when having equal access to the curriculum can be achieved with the use of DT. Digital tools are particularly imperative when trying to enhance numeracy learning outcomes when the UDL principles defined by CAST (2018) and different learning styles of students are recognised (Gardner, 2011).

Cooper, Klinger and McAdie (2017) understand the need for collaboration. Although the findings demonstrate challenges of applying UDL in the classroom, the data findings also identify the need for PD in the area. Teachers can learn from each other and scaffold best practice when applying UDL and DT in the classroom. The *Digital strategy for schools 2015–2020* and the *Digital strategy for schools to 2027* (published by the DES in 2015 and 2022, respectively) reflect the need for DT to be incorporated in the classroom. Numeracy is an enabling factor in allowing people to take part in society (Cockroft, 1982; AAMT, 1998; DES, 2011; OECD, 2016). However, the world is fast becoming technology-saturated, and students will not only need adequate numeracy skills but also DT skills in order to participate fully in society.

The concept of curriculum change is recognised by the DES and evidenced in the Junior Cycle reform, which, through the use of active teaching methodologies, attempted to provide for a more inclusive approach to education. Owiny et al. (2019), Woods and Leahy (2019), and Diaz-Vega, Moreno-Rodriguez and Lopez-Bastias (2020) note the need for such change if UDL is to be considered as a whole-school strategy*. An integrated approach to teaching and learning* (2016) discusses the importance of both numeracy and differentiated instruction, demonstrating the need for curriculum change. PD was noted as a means of overcoming teachers' lack of skills in relation to UDL, but also as an enabling space for successful curriculum reform to take place, which incorporates UDL from the onset. This could be further enhanced through the use of the SSE process, where schools can identify processes and assign responsibilities to administer change while coinciding with the *Digital strategy for schools 2015–2020* and the *Digital strategy for schools to 2027* (DES, 2015; DES, 2022). It should also be noted that in order to incorporate DT as part of a curriculum reform, access to resources need to be considered for all students in the school and home environments.

Conclusion

Numeracy has been a focus of many recent educational policies, and the importance of numeracy was evident in the research findings provided. Although there are various methods identified to effectively incorporate numeracy, UDL is an overarching approach

to teaching and learning that encompasses not only numeracy but is an overall inclusive teaching methodology. The research conducted by Evmenova (2018), in particular, highlighted a need for modelled examples of UDL practices to be provided to teachers and emphasised the need for ongoing training for educators, not only in the area of UDL but also regarding the use of DT to best incorporate numeracy and UDL in the classroom effectively. This is also relevant to graduate student teachers and in the provision of initial teacher training. Similarly, research conducted by Woods and Leahy (2019) illustrates that although UDL is a new concept, most practitioners are already applying UDL conceptual elements through professional reflection of their pedagogies and by researching evidence-based methodologies, making small but significant changes in the classroom. This ILR has emphasised the importance of numeracy when creating lessons and the practical uses of numeracy elements to help student understanding. This study also highlights to student teachers the advantages of using DT to further enhance the life skills needed to fully participate in and contribute to society. The researcher realises that using DT affords opportunities to provide multiple means of engagement, representation, and action and expression when delivering lessons in inclusive classrooms.

References

AHEAD (2017) *Universal Design for Learning.* Available at: https://www.ahead.ie/udl (Accessed: 02 January 2022).

Australian Association of Mathematics Teachers (1998) *Policy on numeracy education in schools*. Adelaide: Author.

Bleach, J. (2015) 'Improving numeracy outcomes for children through community action research', *Educational Action Research*, 23(1), pp.22–35. [Online] Available at: https://doi.org/10.1080/09650792.2014.994016 (Accessed: 04 January 2022).

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp.77–101. [Online] Available at: https://www.researchgate.net/publication/235356393_Using_thematic_analysis_in_psychology (Accessed: 11 June 2022).

CAST (2018) *Universal Design for Learning guidelines version 2.2*. Available at: https://udlguidelines.cast.org/?utm_source=castsite&lutm_medium=web&utm_campaign=none&utm_content=aboutudl (Accessed: 16 February 2022).

Cooper, A., Klinger, D.A. and McAdie, P. (2017) 'What do teachers need? An exploration of evidence-informed practice for classroom assessment in Ontario'*, Educational Research,* 59(2), pp.190–208. [Online] Available at: https://doi.org/10.1080/00131881.2017.1310392 (Accessed: 13 March 2022).

Cull, G. and Travers, J. (2018) 'Mata sa rang co-teaching: inclusive support for numeracy', *Reach*, 31(2), pp.115–128. [Online] Available at: https://reachjournal.ie/index.php/reach/article/view/18 (Accessed: 06 May 2022).

Diaz-Vega, M., Moreno-Rodriguez, R. and Lopez-Bastias, J.L. (2020) 'Educational inclusion through the Universal Design for Learning: alternatives to teacher training', *Education Sciences*, 10. [Online] Available at: https://www.researchgate.net/publication/344898006_Educational_Inclusion_through_the_Universal_Design_for_Learning_Alternatives_to_Teacher_Training (Accessed: 06 May 2022).

Dinmore, S. and Stokes, J. (2015) 'Creating inclusive university curriculum: implementing Universal Design for Learning in an enabling program', *Widening Participation & Lifelong Learning*, 17(4), pp.4–19. [Online] Available at: https://doi.org/10.5456/WPLL.17.4.4 (Accessed: 04 January 2022).

Dunphy, L., Dooley, T., Shiel, G., Butler, D., Corcoran, D., Ryan, M., Travers, J. and Perry, B. (2014) *Mathematics in early childhood and primary education (3–8 years): definitions, theories, development and progression*. [Online] Available at: https://ncca.ie/media/1494/maths_in_ecp_education_theories_progression_researchreport_17.pdf (Accessed: 02 January 2022).

Evmenova, A. (2018) 'Preparing teachers to use Universal Design for Learning to support diverse learners', *Journal of Online Learning Research*, 4(2), pp.147–171. [Online] Available at: https://files.eric.ed.gov/fulltext/EJ1184985.pdf (Accessed: 06 May 2022).

Fosnot, C.T. (1996) 'Constructivism: a psychological theory of learning', in Fosnot, C.T. (ed.) *Constructivism: theory, perspectives, and practice.* New York, NY: Teachers College Press, pp.8–33.

Gardner, H. (2011) *Frames of mind : the theory of multiple intelligences*. New York: Basic Books.

Geiger, V., Goos, M. and Dole, S. (2015) 'The role of digital technologies in numeracy teaching and learning', *International Journal of Science & Mathematics Education*, 13(5), pp.1115–1137. [Online] Available at: https://doi.org/10.1007/s10763-014-9530-4 (Accessed: 20 December 2021).

Great Britain and Cockcroft, W.H. (1982*) Mathematics counts: report of the Committee of Inquiry into the Teaching of Mathematics in Schools under the chairmanship of W.H. Cockcroft*. [Online] Available at: http://www.educationengland.org.uk/documents/cockcroft/cockcroft1982.html (Accessed: 28 December 2021).

Hall, G. and Slaney, S. (2017) 'Developing numeracy in further education', *RaPAL Journal*, (92), pp.15–19. [Online] Available at: https://content.yudu.com/web/1zxba/0A1zxbb/Journal92/html/index.html?page=18 (Accessed: 06 May 2022).

Handal, B., Novak, A., Watson, K., Maher, M., MacNish, J. and Eddles-Hirsch, K. (2014) 'Numeracy education through mobile apps', *Australian Journal of Middle Schooling*, 14(1), pp.28–37. [Online] Available at: https://researchonline.nd.edu.au/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1146&context=edu_article (Accessed: 06 May 2022).

Hopia, H., Latvala, E. and Liimatainen, L. (2016) 'Reviewing the methodology of an integrative review', *Scandinavian Journal of Caring Sciences*, 30(2), pp.662–669. [Online] Available at: https://doi.org/10.1111/scs.12327 (Accessed: 05 May 2022).

Ireland. Department of Education and Skills (2015) *Digital strategy for schools 2015–2020*. [Online] Available at: https://www.gov.ie/en/publication/f8990-digital-strategy-for-schools-2015-2020/ (Accessed: 05 January 2022).

Ireland. Department of Education and Skills (2022) *Digital strategy for schools to 2027*. [Online] Available at: https://www.gov.ie/en/publication/69fb88-digital-strategy-for-schools/ (Accessed: 28 May 2022).

Ireland. Department of Education and Science (2016) *School Self-Evaluation guidelines 2016–2020*. [Online] Available at: https://assets.gov.ie/25263/dcc85452ad6d451f89ed8e7b1967f200.pdf (Accessed: 30 November 2021).

Ireland. Department of Education and Skills (2011) *Literacy and numeracy for learning and life*. [Online] Available at: https://assets.gov.ie/24520/defd56aec10946798ab2d32a42dc0d86.pdf (Accessed: 28 December 2021).

Ireland. Department of Education and Skills (2015) *Framework for Junior Cycle*. [Online] Available at: https://ncca.ie/media/3249/framework-for-junior-cycle-2015-en.pdf (Accessed: 12 December 2021).

Jesson, J., Matheson L. and Lacey, F. (2011) *Doing your literature review: traditional and systematic techniques*. Sage: Thousand Oaks.

Ko, J., Sammons, P. and Bakkum, L. (2013) *Effective teaching: a review of research and evidence*. Reading: CFBT Education Trust.

NCCA (2009) *Senior Cycle key skills framework*. [Online] Available at: https://www.curriculumonline.ie/getmedia/161b0ee4-706c-4a7a-9f5e-7c95669c629f/KS_Framework.pdf (Accessed: 08 January 2022).

NCCA (2014) *Key skills of Junior Cycle*. [Online] Available at: https://ncca.ie/media/2115/key_skills_2014.pdf (Accessed: 12 December 2021).

OECD (2016) 'Skills matter: further results from the survey of adult skills', *OECD Skills Series.* [Online] Available at: http://dx.doi.org/10.1787/9789264258051-en (Accessed: 07 January 2022).

Owiny, R.L., Hollingshead, A., Barrio, B. and Stoneman, K. (2019) 'Engaging preservice teachers in Universal Design for Learning lesson planning', *Inclusion*, 7(1), pp.12–23. [Online] Available at: https://doi.org/10.1352/2326-6988-7.1.12 (Accessed: 28 December 2021).

Parsons, S. and Bynner, J. (1997) 'Numeracy and employment', *Education + Training*, 39(2), pp.43–51. [Online] Available at: https://www.researchgate.net/publication/240959556_Numeracy_and_employment (Accessed: 02 January 2022).

Peters, E., Tompkins, M.K., Knoll, M.A.Z., Ardoin, S.P., Shoots-Reinhard, B. and Meara, A.S. (2019) 'Despite high objective numeracy, lower numeric confidence relates to worse financial and medical outcomes', *Proceedings of the National Academy of Sciences of the United States of America*, 116(39), pp.19386–19391. [Online] Available at: https://www.pnas.org/content/116/39/19386 (Accessed: 28 December 2021).

Pischa, B. and Coyne, P. (2001) 'Smart from the start. The promise of Universal Design for Learning', *Remedial and Special Education,* 22(4), pp.197-203. [Online] Available at: https://doi.org/10.1177%2F074193250102200402 (Accessed: 05 May 2022).

Primary Professional Development Service (no date) *Differentiation in action!* [Online] Available at: https://pdst.ie/sites/default/files/Session%202%20-%20Differentiation%20Resource%20_0_0.pdf (Accessed: 05 January 2022).

Professional Development Service for Teachers (2016) *An integrated approach to learning, teaching and assessment.* [Online] Available at: https://pdst.ie/sites/default/files/Integrated%20Approach_0.pdf (Accessed: 05 January 2022).

Stassen, K. and Baumgart, T. (2014) 'Deadly numeracy: teachers as researchers', *Australian Journal of Middle Schooling*, 14(1), pp.46–50. [Online] Available at: https://search.informit.org/doi/epdf/10.3316/aeipt.204363 (Accessed: 06 May 2022).

Vygotsky, L. (1978) *Mind in society*. Cambridge, MA: Harvard University Press.

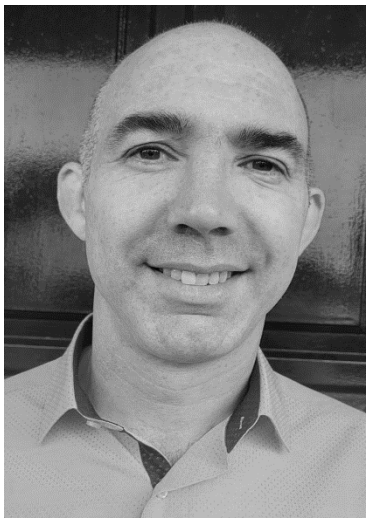
Westine, C.D., Oyarzun, B., Ahlgrim-Delzell, L., Casto, A., Okraski, C., Park, G., Person, J. and Steele, L. (2019) 'Familiarity, current use, and interest in Universal Design for Learning among online university instructors', *International Review of Research in Open and Distributed Learning*, 20(5), pp.20–41. [Online] Available at: https://doi.org/10.19173/irrodl.v20i5.4258 (Accessed: 02 April 2022).

Whittemore, R. (2008) 'Rigour in integrative reviews', in Webb, C. and Roe, B. (eds.) *Reviewing research evidence for nursing practice: systematic reviews*. Oxford: Blackwell publishing, pp.149–155.

Whittemore, R. and Knafl, K. (2005) 'The integrative review: updated methodology', *Journal of Advanced Nursing*, 52(5), pp.546–553. [Online] Available at: https://users.phhp.ufl.edu/rbauer/EBPP/whittemore_knafl_05.pdf (Accessed: 19 April 2022).

Woods, A. and Leahy, M. (2019) 'Using digital technologies to support inclusion in the mainstream classroom', *Reach*, 32(2), pp.102–124. [Online] Available at: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjNr6KajJn6AhXITsAKHQsrBQ0QFnoECA0QAQ&url=https%3A%2F%2Freachjournal.ie%2Findex.php%2Freach%2Farticle%2Fdownload%2F11%2F11&usg=AOvVaw3iY1dsfzAHEe6LvocN9-cx (Accessed: 06 May 2022).

Effective Integration of ICT with Teaching and Learning in Post-Primary Education in Ireland



Stephen O'Dowd

Biography

Having graduated with a BA in English and Sociology from NUI Maynooth and later achieving a Postgraduate Diploma in Technical Communication from University of Limerick, Stephen O'Dowd has worked in customer-facing, business development roles for a number of years. In 2017, he undertook a Master of Business in Management and Marketing Strategy in Limerick Institute of Technology (now TUS). In 2021, Stephen pursued a career in teaching and graduated with a 2.1 honours in the Professional Master of Education (PME) from Hibernia College. In drawing on his life experiences in diverse roles, Stephen has realised his dream of helping students reach their full potential. Currently, he has a keen interest in the use of technology in post-primary education.

Effective Integration of ICT with Teaching and Learning in Post-Primary Education in Ireland, by Stephen O'Dowd

Research Supervisor: Norah Sweetman

Abstract

Irish government policy promotes the integration of Information Communications Technology (ICT) into teaching and learning in post-primary education to support a constructivist, student-focused classroom. Guidance on how to best use ICT in the classroom is, however, unclear, and benefits to students appear to be superficial. The aim of this dissertation focused on barriers to the integration of ICT and strategies to integrate the medium for effective teaching and learning. Using documentary research in the form of an Integrative Literature Review (ILR), twelve peer-reviewed papers that focus on ICT integration in post-primary education were selected. Through thematic analysis and coding, four themes became apparent, namely: pedagogy, the policy-reality gap, teacher attitudes and beliefs, and the digital divide. The themes were critically analysed and discussed in relation to Irish policy and with wider literature. Key findings demonstrated that a greater critical perspective on the use of ICT is required from policy makers and educational leaders; more focus on pedagogy, teacher beliefs and attitudes is needed in the continuing professional development (CPD) of ICT; and finally, a positive school leadership and a collaborative school culture encourages teachers to use ICT.

Keywords: CPD, digital divide, digital strategy, ICT, pedagogy, teacher attitudes and beliefs, technological pedagogical content knowledge (TPACK)

Introduction and Background

UNESCO (2018) and the Irish Government Policy (DES, 2015) promote the use of ICT in post-primary education. By integrating ICT in the post-primary classroom, ICT enhances both a constructivist pedagogy and the learning experiences of students. Students can develop key skills such as critical thinking, collaborative learning and information processing, all of which underpin the key skills of Junior Cycle (NCCA, 2015). Given the universal importance of integrating ICT with education in Ireland, this dissertation sought to determine the best use of ICT in post-primary schools. In explaining the rationale for the use of ICT in education, the 2015 *Digital strategy for schools* states, 'this is how we must work because ICT is a powerful tool that can change the way teachers teach and how students learn' (DES, 2015, p.4). Even though the DES does not outline how ICT can change teaching and learning, it emphasises the importance of embedding ICT in continuing professional development (CPD).

In determining how teachers teach, Shinas and Steckel (2017) have designed a conceptual framework that combines three types of knowledge required for the effective use of ICT in education, namely technological pedagogical content knowledge (TPACK), which combines technological knowledge, pedagogical knowledge and content knowledge. They surmise that if sufficient knowledge is lacking in one domain, the delivery of what is being taught is not at its most optimum or relevant level for students'

learning. Shinas and Steckel emphasise the importance of beginning with the content that one plans to teach rather than with the technology one wants to integrate. McDonagh and McGarr (2015, p.64) reach a pessimistic conclusion that the predominant view of ICT use in schools is that technology 'will determine the nature of future educational practices rather than being something that is shaped by emerging pedagogies'. The *Digital strategy for schools* is informed by a consultative paper by Butler et al. (2013). Butler et al. also share the concerns of other authors when they state that using digital technology and resources is 'not necessarily a precondition to knowledge deepening and/or knowledge creation' (pp.4-5). Placing technology above teaching is an issue that is addressed by Marcus-Quinn and McGarr (2013). The authors see the digital divide as the different approaches teachers adopt in their use of ICT in the classroom — between those that give autonomy to the students and facilitate their learning and those that teach didactically. Marcus-Quinn and McGarr's research finds a divide that is not defined by access but by how technology is used. Accordingly, technology must be used in a constructive and meaningful way for students to achieve their learning outcomes. However, Marcus-Quinn and McGarr's research findings reveal that teaching influences how technology is used and a lack of autonomy is being given to students' learning. The authors state that this type of technology use operates at a superficial level for students as opportunities to develop their critical thinking are minimised. Stockman and Truyen (2011) developed a theoretical framework based on teachers' adoption of the technology process. They see the practice as a spiral whereby the higher up teachers find themselves, the more successful the integration of technology. The greatest factors that affect teachers in adopting ICT are the internal factors of confidence and competence and the external factors of support and IT skills. With low levels in each of these factors, Stockman and Truyen describe teachers as finding themselves in a downward spiral.

Lai and Pratt's (2007) work looks at the effects of ICT use in education. Their findings show that ICT use in post-primary schools has led to more efficiency in management and administration while the expected changes in teaching and learning do not occur. Lesson preparation and planning are seen to improve the situation, but teaching philosophies and pedagogies remain largely unchanged. In a more recent paper by Coyne et al. (2015), the issues raised by Lai and Pratt are still prevalent. Coyne et al. question whether students' critical thinking skills — a Junior Cycle key skill (NCCA, 2015) — are developed through the use of ICT or whether its use remains at a superficial level. Coyne et al. conclude that the adoption of ICT, as promoted by international and national policies, should not simply focus on technical implementation but on teacher beliefs, efficient use of ICT and pedagogies. Regarding ICT leadership, McDonagh and McGarr (2015) state that there exists a lack of a critical perspective on ICT whilst international and national policies promote its widespread implementation and use in post-primary education.

ICT and Policy

UNESCO (2018) uses the term ICT in devising its ICT Competency Framework for Teachers (ICT CFT), that which is embedded in the DES digital strategy. UNESCO'S ICT CFT acts as a framework that provides an overview on how the use of ICT in education can become embedded in teaching and learning. The framework consists of six interlinking aspects of a teacher's professional practice, which include curriculum and assessment, pedagogy, and the application of digital skills. UNESCO recognises that the

framework should be used throughout a teacher's professional life. By using and integrating ICT, knowledge acquisition, knowledge deepening and knowledge creation of the six interlinking aspects are facilitated. In summary, the UN sees ICT supporting the development of knowledge societies. It is noteworthy that Butler et al. (2013, p.11) propose that the term 'Learning Society' should be used to describe the times that we live in rather than 'Knowledge Society' because it indicates the requirement for lifelong learning.

The need for lifelong learning of ICT is recognised elsewhere. In the DES (2015) *Report on the consultation with young people on the digital strategy for schools*, one of the key findings asserts that students recognise that teachers should be provided with ongoing ICT training. Another student recommendation suggests technology needs to be more relevant to their learning needs. In her critique of digital technology and its effect on education, Turkle (2016, p.241) asks why technology is put at the centre of an educational agenda because, as 'a kind of learning', it does not teach students to raise their hands and enter into a conversation. This initial review of literature informed the following research questions:

1. What are the barriers to effective ICT integration with teaching and learning in post-primary education in Ireland?
2. What are the factors for the successful integration of ICT with teaching and learning in post-primary education in Ireland?

Methodology

An interpretivist, qualitative approach through the use of documentary research was chosen as the research methodology for this dissertation. Empirical, peer-reviewed qualitative research articles were used to address the research questions. According to Torraco (2016), literature reviews are often carried out on topics of growing interest in literature. These topics may not have, however, undergone substantial critical analysis. There may also be a discrepancy between observations of a topic or phenomenon and the literature on the topic — an important reason for literature reviews to be conducted. Regarding the universal implementation of ICT in post-primary education and its wide-spread coverage in literature, observations — and a literature review — may unearth less detailed factors, practices and opinions of ICT use in education. Whittemore and Knafl (2005) state that an ILR provides different perspectives on a phenomenon. Torraco (2016) adds that literature reviews serve the purpose of adding value to a topic and can identify strengths and weaknesses of the literature that may lead to a reconceptualisation of the topic. A reconceptualisation can occur when omissions or discrepancies are identified in the literature and, therefore, a critique is required. The purpose of the literature review that is of most relevance to this dissertation concerns 'a means for answering specific research questions about a topic' (Torraco, 2016, p.64). Toronto (2020) further states that when deciding to conduct a literature review, the research question(s) should be formulated and followed by a collection and analysis of data drawn from the literature. Toronto (2020) points out that an ILR requires a systematic approach that is rigorous and transparent. While Toronto, along with others (Whittemore and Knafl, 2005; Whittemore, 2007; Torraco, 2016), states that there is no consistent set of guidelines on how best to conduct an ILR, she recognises the influence of Cooper's (1998) widely used methodological approach that guides the ILR design.

There are five stages to Cooper's methodological approach, which are: problem formulation; literature search; data evaluation; data analysis; and presentation. The ILR process of this dissertation followed this methodological approach by using these stages as the framework.

Data Analysis

A total of fifty papers were screened, which then involved reading a total of twenty abstracts. Fourteen papers were read and, finally, the papers were refined to the final twelve for review. A summary table (Table 2) was compiled, which outlines the important elements of the twelve research papers. The papers were then read and re-read, notes were made, and text was highlighted in search of patterns of meanings. The coding of material was then followed by a process of thematic analysis. Thematic analysis is, according to Braun and Clarke (2006), a search across a dataset such as a collection of research papers to find repeated patterns of meaning. According to these authors, this constructivist method examines social discourses and realities. Thematic analysis can 'unpick reality' and, using this method and to paraphrase Braun and Clarke (p.81), the researcher aimed to unpick and 'unravel the surface' of ICT integration in post-primary education. In this case, the researcher takes an active role in discovering themes rather than a passive one where themes are seen to emerge. Once the themes were identified and it was determined that they were prevalent across the papers, the story of each theme was told and discussed in relation to the research questions, teaching practice and policy.

Table 2: Summary of Selected Papers

	Authors	**Purpose**	**Sample**	**Methodology**	**Findings/Summary**
1	Quinn and McGarr (2013)	To capture the collaborative design and development process used in the development of digital resources and evaluate the implementation by teachers	167 (154 students, 13 teachers) in Ireland	Qualitative case study involving interviews, focus groups and questionnaires	The digital divide is not only about access to ICT. It should also be defined by how ICT is used. One student cohort were given autonomy to learn while another cohort were taught didactically.
2	Clarke (2017)	To explore a particular way in which teachers can creatively introduce a new and useful technology known as Instructional Digital Storytelling (IDS)	4 post-primary school teachers in Ireland	Qualitative, practitioner-based narrative inquiry	Use of technology was connected to curriculum requirements, and time constraints can limit the development of technological pedagogy.

3	Benini (2014)	To reflect and understand the current uses and expectations of ICT for learning in general and language learning in particular	2 post-primary schools in Ireland	Qualitative case study with mixed-methods approach conducting semi-structured interviews together with surveys and classroom observations; 77 students	Teachers recognised the importance of ICT, but there are limitations due to training needs and lesson preparation. Often, the use of ICT is seen as a backup for learning instead of preparation for knowledge acquisition.
4	McDonagh and McGarr (2015)	To explore ICT coordinators' discourse in relation to ICT integration in a sample of post-primary schools	*37 ICT coordinators (first phase) and 9 ICT coordinators (second phase) in post-primary schools in Ireland	Qualitative semi-structured interviews with a stratified random sample of ICT coordinators	Progress is seen in terms of ICT resources rather than how ICT can be shaped by emerging pedagogies. There is a disparity between policy and the actual use of ICT.
5	Coyne, Devitt, Lyons and McCoy (2015)	To examine the factors influencing teachers' attitudes to ICT and their perceived barriers to adopting new technologies in their day-to-day teaching	436 post-primary schools in Ireland (teachers and principals)	Mixed-method online survey (purposive sample). In total, 272 principals and 880 teachers responded to the survey.	Most teachers are positive about the impact and usefulness of ICT. However, ICT is used more outside of the classroom in preparing for lesson plans. A much smaller proportion of students are using ICT in the classroom.
6	Daniels, Jacobsen, Varnhagen and Friesen (2013)	To report on barriers that impede systemic, effective and sustainable technology integration within schools	2,433 students, 420 teachers	Mixed-method case study approach involving online surveys, interviews and field notes	Schools did not re-examine their vision to leverage ICT; there is little evidence that research is being used to inform practice, and access to technology is a limiting factor.

7	Johnston, Ni Riordain and Walshe (2014)	To design, develop, implement and evaluate an integrated approach to the teaching and learning of Science and Mathematics in second level schools in Ireland	3 schools in Ireland (one Mathematics teacher and one Science teacher in each school)	A qualitative, exploratory, year-long case study using reflective journals, lesson observations and focus group interviews	A key finding was the integration of maths and science was lost in coping with technology demands. The teachers' confidence and competence of the technology impacted on the implementation of the lessons.
8	McGarr and Ó Gallchóir (2020)	To explore how Irish pre-service teachers justify the use of mobile technologies in schools	23 pre-service teachers	Qualitative approach with pre-service teachers presented with a vignette on which they justify an iPad initiative	There is a lack of a pedagogical perspective on the use of technology, and pre-service teachers drew on the discourse of inevitability surrounding technology. There is a lack of a critical perspective on the use of ICT.
9	Hill and Uribe-Florez (2020)	To explore the technological, pedagogical, and content knowledge (TPACK) of middle and high school maths and special education teachers and how teachers integrate technology in their mathematics classrooms	31 teachers	Mixed-method approach with data collected using a survey with 22 close-ended questions and 7 open-ended questions	The quantitative data indicated that teachers have a low average score of knowledge of technology and higher average scores of knowledge of pedagogy and content. Teachers indicated a lack of time for learning new technology, for planning and for implementing ICT in the classroom.
10	Selwyn, Nemorin and Bulfin (2020)	To explore the ways in which students perceive digital technology as being helpful and/or useful to their schooling	1,174 students	Survey data collected as part of a mixed-method study of technology use across three case study high schools	The benefits of ICT most cited by students were information retrieval and communication. ICT is not transforming the student experience like the claims made in educational policy.

11	Sun and Gao (2019)	To understand the roles that school leaders and teachers play in an instructional reform supported by ICT as well as how these roles interact with each other	1 executive vice-principal and 13 teachers in a secondary school of 713 staff and 9,200 students in China. Some teachers also had administrative roles.	Qualitative case study involving document analysis, interviews and observations	Supportive organisational and pedagogical systems allowed the teachers to move from being passive to active users of ICT and to develop their pedagogies.
12	Uğur and Koç (2019)	To assess how principals' leadership roles have changed in secondary schools in relation to ICT developments	10 secondary school principals in Turkey	Qualitative approach consisting of semi-structured interviews	A lack of professional development and time management can hinder the development of ICT implementation. Both principals and teachers need technology professional development. Principals should be in position to amend the visions of schools to reflect ICT requirements.

Findings and Discussion

Themes and Discussion

Four themes of pedagogy, teacher attitudes and beliefs, the policy-reality gap, and the digital divide are presented in the context of the selected papers and in relation to the wider research and policy literature.

Pedagogy

The intersection of technology and pedagogy is explored in most of the selected papers. The complexity and the gradual process of the implementation of ICT influence teacher confidence and pedagogy. In Johnston, Ni Riordain and Walshe's (2014) case study of the integration of science and maths by using technology in Ireland, there is evidence of a didactical style of teaching due to the teachers' lack of confidence in using the technology. This is in common with a finding from Marcus-Quinn and McGarr's (2013, p.298) case study in Ireland into the design and collaborative use of digital resources by teachers, where a lack of confidence in technology led to 'excessive control over the content'. Research conducted in the Irish context by McDonagh and McGarr (2015) reports that the use of ICT seemed to augment existing pedagogies and these pedagogies were didactic and led to teacher-dominated lessons. The authors report that the role of the ICT coordinator should be as an agent of change for developing

pedagogies. Coyne et al. (2015) point out that most ICT use is outside of the classroom, with teachers using it to prepare for their lessons and for administrative purposes whereby teachers are not 'fully exploiting the potential of ICT for innovative teaching practices' (Coyne et al., pp.373–374). Similar to McDonagh and McGarr (2015) in their research of barriers to effective ICT integration in Canadian post-primary education, Daniels et al. (2013) note that ICT was being used in teacher-led discussions instead of being used in a student-centred way. Johnston, Ni Riordain and Walshe (2014) assert that as part of professional development, teachers should receive pedagogical training in how to use ICT. McGarr and Ó'Gallchóir's research on pre-service teachers' attitudes towards ICT notes that ICT is a mandatory element in teacher-training programmes yet there is a lack of consensus as to what ICT training should entail.

As we have seen with Shinas and Steckel's (2017) conceptual TPACK model, which built upon the work of Mishra and Koehler (2006), the triumvirate of knowledge — technology, pedagogy and content — is required for the effective use of ICT in education. Hill and Uribe-Florez (2020) reiterate that TPACK influences the integration of ICT in the classroom, and teachers in their study struggled most with integrating pedagogy with technology. Hill and Uribe-Florez point out when citing Harris and Hofer (2011):

> When teachers have a specific learning goal in mind, they may be more confident in their knowledge for selecting *ICT* to meet that goal rather than a general knowledge of *ICT* (p.1247).

The statement reinforces the points Bao et al. (2017) make when they state that success is determined by how technology is used to achieve the learning outcomes for students. Shinas and Steckel (2017) agree when they stress that one should begin with the content that one plans to teach rather than with the ICT one wants to integrate. Without clear direction and support, TPACK may continue to be elusive. While policy enthuses teachers on the integration of ICT, the reality may be very different.

The Policy-Reality Gap

Sun and Gao's (2019) research highlights the importance of school leadership providing organisational and pedagogical systems that support teachers to integrate ICT with teaching and learning. In Sun and Gao's example, to avoid superficial use of ICT, the vice-principal introduced an ICT-based, flipped classroom model to support its implementation. McDonagh and McGarr (2015) ascertain that policy makers must take greater consideration of the importance of this type of leadership because the focus on ICT is currently dominated by issues of hardware and resources. McDonagh and McGarr also cite Judge (2013) and Selwyn (2011) in stating there is an emerging gap between policy and public discourse and the reality of ICT implementation. In citing Kompf (2005, p.221) the authors postulate that policy and public discourse view classrooms without computers as 'a deprived learning context' (p.57). McDonagh and McGarr highlight a lack of a critical perspective on the implementation and use of ICT, as do Daniels et al. (2013), Coyne et al. (2015), Sun and Gao (2019), McGarr and ÓGallchóir (2020), and Selwyn et al. (2020). In McDonagh and McGarr's (2015) Irish study, they advocate for the need for policymakers and educational leaders to address the disparity between policy and reality.

In many respects, Daniels et al.'s (2013) Canadian research mirrors that of McDonagh and McGarr (2015) in finding the most common approach to ICT implementation in schools as focused on placing as much ICT hardware and resources as possible in schools rather than on centring on how ICT can be used to create active learning opportunities for students. In an Irish and global context, McGarr and Ó'Gallchóir (2020, p.477) caution us that 'there are growing concerns globally that the adoption of technology in schools is superficial' and, as we have seen, it tends to support a teacher-centred instead of a student-focused approach.

In Selwyn et al.'s (2020) Australian study of the benefits of ICT on students' learning, the most common student use of technology involves searching for information and communication. It must be remembered that the *Digital strategy for schools* (2015) views ICT as a powerful tool that can change teaching and learning. In UNESCO's *ICT competency framework for teachers* (2018, p.7), there is an emphasis that teachers 'must be able to use ICT to help students become collaborative, problem-solving, creative learners and innovative and engaged members of society'. Unfortunately, however, despite its commendable aims, research demonstrates that, for the most part, this is not being achieved. Using ICT to think creatively and critically, as espoused by the NCCA (2015), is not apparent from a review of these papers.

Teacher Attitudes and Beliefs

McGarr and Ó'Gallchóir (2020, p.589) cite Ertmer et al. (2012) and Kavanozet et al. (2015) when they posit, 'teacher education should focus more on challenging teachers' attitudes and beliefs'. McGarr and Ó'Gallchóir find that pre-service teacher beliefs in relation to ICT are important because they can have a big impact on the integration and efficient use of ICT; their research shows that pre-service teachers appear to focus on the use of technology instead of focusing on the ways in which students can learn. In citing Hammond (2014), the authors state that the pre-service teachers in their study follow the inevitable public and policy discourse on ICT. McDonagh and McGarr (2015, p.65) further cite Winner (1986) in describing this mindset as 'technological somnambulism'. The lack of a critical lens or 'the sleepwalking' that Winner describes can be addressed in teacher education by challenging such attitudes and beliefs. While ICT is a mandatory element in teacher education, McGarr and Ó'Gallchóir (2020) find that there is a lack of consensus as to how ICT should be developed as part of teacher education programmes. In citing Papanastasiou and Angeli (2008), Coyne et al. (2015) state that teacher attitudes towards ICT and their beliefs about its use affect the integration of ICT in post-primary education. Sun and Gao (2019) and Uğur and Koç (2019) note that schools that are more successful with the integration of ICT are 'characterised by positive school leadership…and the availability of professional support and guidance' Coyne et al. (p. 361). In their Turkish study, Uğur and Koç find that principals believe that it is important for them to engage with the professional development of ICT so that they can lead the ICT implementation and integration in their schools. The authors deduce that if the leader has a mission and a vision that incorporates ICT, teachers will be encouraged to embrace its use.

Five of the papers (Marcus-Quinn and McGarr, 2013; Benini, 2014; Johnston et al., 2014; Clarke, 2017; Hill and Uribe-Florez, 2020) look at how ICT is integrated with specific subjects — English (languages), Maths and Science. Four of the papers are based on research in Ireland and one is based on research in America. One of the most

resonant findings in the papers focuses on the lack of teacher confidence in using ICT as a barrier to its effective use, which can lead to didactical, instructional-style teaching. Sun and Gao (2019) report that the vice-principal and the administrators noticed differences in how ICT was integrated into different subjects. Hill and Uribe-Florez find that Maths teachers tend to be more positive and open to the integration of ICT than other subject teachers. These papers suggest that, in promoting the integration of ICT in education, Irish and international policy should provide teachers with greater guidance to become more cognisant of how ICT can be integrated across different subjects.

The Digital Divide

The NCCA (2004) sees the digital divide as the divide between students who have access to technology and those students who do not, mainly due to socio-economic constraints and the subsequent effects on achievement levels. In their study of how ICT is used in schools, Marcus-Quinn and McGarr (2013) consider that the digital divide should be defined by how technology is used and not be defined by access to technology. They state that the divide is not ICT related. Instead, it relates to the learning experience of the students and whether they are given a level of autonomy to learn or whether they are inhibited by an experience of didactical-style teaching. Clarke (2017) cites Llorens et al. (2002) in further expanding on this disconnect in stating that the digital divide was amongst teachers — between those teachers who had received ICT support and those who had not. High-quality professional development that considers teacher attitudes and beliefs can encourage 'collaborative learning communities' (Clarke, p.2047). Such communities can have a positive correlation to student achievement levels. Sun and Gao (2019) highlight the positive influence that such collaborative learning environments can have on the integration of ICT.

A third digital divide is recognised in Uğur and Koç's (2019) Turkish study, which is based on school principals' perspectives. Participants in the study recognised a divide between students and their teachers and describe this 'as a split between students *growing up* in a technology-driven society and the technology-challenged teachers' (Uğur and Koç, p.61). Such research resonates with the Australian high school study that Selwyn, Nemorin and Bulfin (2020) carried out in exploring student perspectives on the use of ICT in the classroom. Their research demonstrated that students' experience in the classroom is one where they are passive in being led or stimulated by the teacher. Based on their experiences of ICT in school, students believe that the greatest benefit centred on their 'internet-based information seeking and retrieval' (Selwyn et al., p.8) and here, information retrieval was valued for its speed. Arising from the findings, it is apparent that collaboration and the development of critical-thinking skills through the use of ICT — specific aims of the NCCA — are not recognised as benefits to students in the reviewed research papers. Based on the papers in this review, perhaps ICT policymakers and educational leaders should consider redefining the concept of the digital divide.

Conclusion

This thesis critically examined the complex and gradual process of integrating ICT with teaching and learning and how it can affect teachers' confidence and pedagogy. A lack of confidence in using ICT can lead to didactical-style teaching. A strong case for professional development of ICT focused on pedagogy arises from the selected papers.

There exists a lack of critical perspectives concerning the gap between policy and the reality of ICT usage that prioritises more meaningful learning. Positive school leadership and collaborative working environments can help support teachers to integrate ICT more effectively. Finally, the digital divide is not just about access to ICT. Many of the authors highlight that the more pertinent divide relates to the use of ICT by teachers and students. This research calls for more critical discourse and perspectives on the use of ICT to enable and equip teachers with greater knowledge and skills to transfer as more meaningful and relevant learning experiences for students.

References

Bao, M., Taylor Moore, T., Tinianow, D. and Nideffer, J. (2017) 'Enhancing teaching and learning through technology: a comparative study of YouSeeU integration', *The International Journal of Technologies in Learning*, 24(1).

Benini, S. (2014) 'Is ICT really essential for learning? Perceptions and uses of ICTs for language acquisition in secondary level environments', *CALL Design: Principles and Practice*, pp.23–28.

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp.77–101.

Butler, D., Leahy, M., Shiel, G. and Cosgrove, J. (2013) *Building towards a learning society: a national digital strategy for schools*. Dublin: Educational Research Centre.

Clarke, A.M. (2017) 'A place for digital storytelling in teacher pedagogy', *Universal Journal of Educational Research,* 5(11), pp.2045–2055.

Coyne, B., Devitt, N., Lyons, S. and McCoy, S. (2015) 'Perceived benefits and barriers to the use of high-speed broadband in Ireland's second-level schools', *Irish Educational Studies*, 34(4), pp.355–378.

Daniels, J., Jacobsen, M., Varnhagen, S. and Friesen, S. (2013) 'Barriers to systemic, effective, and sustainable technology use in high school classrooms', *Canadian Journal of Learning and Technology/La revue canadienne de l'apprentissage et de la technologie*, 39(4).

Department of Education and Skills (2015) *Digital Strategy for Schools 2015–2020: Enhancing Teaching, Learning and Assessment.* [Online]. Available at: · https://assets.gov.ie/24382/7b035ddc424946fd87858275e1f9c50e.pdf (Accessed: 10 April 2019)

Department of Education and Skills. (2015) *Report on the consultation with young people on the digital strategy for schools*. [Online] Available at: https://assets.gov.ie/24393/da5744b0f3c04222a82efcd5cde51a79.pdf (Accessed: 12 April 2019).

Hill, J.E. and Uribe-Florez, L. (2020) 'Understanding secondary school teachers' TPACK and technology implementation in Mathematics classrooms', *International Journal of Technology in Education (IJTE)*, 3(1), pp.1–13.

Johnston, J., Riordain, M.N. and Walshe, G. (2014) 'An integrated approach to the teaching and learning of Science and Mathematics utilising technology — the teachers' perspective', *Journal on School Educational Technology*, 9(4), pp.14–26.

Lai, K.W. and Pratt, K. (2007) 'Positive to a degree: the effects of ICT use in New Zealand secondary schools', *Computers in the Schools*, 24(3–4), pp.95–109.

Marcus-Quinn, A. and McGarr, O. (2013) 'Digital divide in post-primary schools', in Fowley, C., English, C. and Thouësny, S. (eds.) *Internet research, theory, and practice: perspectives from Ireland*. Dublin, pp.277–303.

McDonagh, A. and McGarr, O. (2015) 'Technology leadership or technology somnambulism? Exploring the discourse of integration amongst information and communication technology coordinators', *Irish Educational Studies*, 34(1), pp.55–68.

McGarr, O. and Ó'Gallchóir, C. (2020) 'Exploring pre-service teachers' justifications for one-to-one technology use in schools: implications for initial teacher education', *Technology, Pedagogy and Education*, 29(4), pp.477–490.

National Council for Curriculum and Assessment (NCCA) (2004) *Board of studies for the review of technology education in the Junior Cycle*. [Online] Available at: https://ncca.ie/media/1830/review_of_technology_education_in_the_junior_cycle_final_report_of_the_board_of_studies.pdf (Accessed: 12 April 2019).

National Council for Curriculum and Assessment (NCCA) (2015) *Framework for Junior Cycle*. [Online] Available at: https://ncca.ie/media/3249/framework-for-junior-cycle-2015-en.pdf (Accessed: 12 April 2019).

Selwyn, N., Nemorin, S., Bulfin, S. and Johnson, N.F. (2020) 'The "obvious" stuff: exploring the mundane realities of students' digital technology use in school', *Digital Education Review*, 37, pp.1–14.

Shinas, V.H. and Steckel, B. (2017) 'Technology integration for the 21st century classroom: principles for effective planning', *New England Reading Association Journal*, 52(1), pp.1–121.

Stockman, C. and Truyen, F. (2011) *Proceedings of the European Conference on e-Learning*, pp.811–819.

Sun, Y. and Gao, F. (2019) 'Exploring the roles of school leaders and teachers in a school-wide adoption of flipped classroom: school dynamics and institutional cultures', *British Journal of Educational Technology*, 50(3), pp.1241–1259.

Toronto, C.E. (2020) 'Overview of the integrative review', *A Step-by-Step Guide to Conducting an Integrative Review*, pp.1–9.

Torraco, R.J. (2016) 'Writing integrative reviews of the literature: methods and purposes', *International Journal of Adult Vocational Education and Technology (IJAVET)*, 7(3), pp.62–70.

Turkle, S. (2015) Reclaiming conversation: the power of talk in the digital age. New York: Penguin Random House.

Uğur, N.G. and Koç., T. (2019) 'Leading and teaching with technology: school principals' perspective', *International Journal of Educational Leadership and Management*, 7(1), pp.42–71.

United Nations Educational, Scientific and Cultural Organization (UNESCO) (2018) *ICT competency framework for teachers*. Version 3. Paris: UNESCO.

Whittemore, R. and Knafl, K. (2005) 'The integrative review: updated methodology', *Journal of Advanced Nursing*, 52(5), pp.546–553.

Whittemore, R. (2007) 'Rigour in integrative reviews', in Webb, C. and Roe, B. (eds.) *Reviewing research evidence for nursing practice: systematic reviews*, pp.149–156.

Literacy, Socio-Economic Status, and Inclusion: An Integrative Literature Review Exploring the Delivery of Inclusive Early Literacy Interventions in Disadvantaged Settings

Donal O'Shea

Biography

Donal O'Shea is a newly qualified primary school teacher, having completed the Hibernia College Professional Master of Education (PME) in April 2022. Prior to undertaking the PME programme, Donal graduated with a Bachelor of Music (Hons) Degree from the CIT Cork School of Music and worked for several years as a violin teacher and musician. He also worked as a technical writer before deciding to pursue a professional teaching qualification. Donal is interested in music, sport, nature and environmental education and enjoys sharing these passions with his students. He has recently secured a job as a Senior Infant teacher in a Cork City school. He is looking forward to putting the knowledge he has gained through the completion of this research project into practice in the classroom in the year ahead.

Literacy, Socio-Economic Status, and Inclusion: An Integrative Literature Review Exploring the Delivery of Inclusive Early Literacy Interventions in Disadvantaged Settings, by Donal O'Shea

Research supervisor: Sarah Finnegan

Abstract

The researcher utilised an interpretivist approach to examine the links that exist between low socio-economic status and low literacy attainment levels in primary education in Ireland. The aim of the thesis was to examine the efficacy of current initiatives and interventions in addressing the attainment gap. Following the integrative literature review process, twelve research articles were selected and thematic analysis was conducted to synthesise the findings and address the identified research questions. The findings were critically situated and discussed in the wider policy and research context. Results of the thesis demonstrate that while there is a clear correlation between low socio-economic status and low literacy attainment, existing interventions can make a small but significant impact in confronting the attainment gap and can potentially help to create a more inclusive learning environment.

Keywords: socio-economic status, disadvantage, literacy, inclusion

Introduction and Background

Literacy is one of the core tenets of the primary curriculum in Ireland. However, gaps in literacy attainment exist from the earliest stages of education, and one cohort that lags noticeably behind their peers are children from socio-economically disadvantaged backgrounds (Kennedy et al., 2012). This literacy attainment gap is difficult to address within the parameters of daily teaching and learning in the Irish context due to the heavy curricular demands on primary teachers along with large classroom sizes, which are often four to five times larger than the average class size of other comparable EU countries (DES, 2021). As such, it is a major challenge for educators in Ireland to deliver fully inclusive literacy education where each child is provided with the tools and resources necessary to extract the maximum value from their education (Obiakor et al., 2012). One solution currently in place is literacy interventions and initiatives aimed at addressing the literacy attainment gap in Irish primary schools. In this study, the researcher assesses the success of existing literacy interventions, in Ireland as well as other comparable education systems, in addressing the literacy attainment gap as correlated with socio-economic status.

Inclusive Education

Inclusive education is a major goal, and challenge, for education systems around the world (Navarro et al., 2016). It can be defined broadly as the delivery of education in which barriers to entry and full participation are removed from classrooms and schools

(Milton, 2017). In recent years, conceptions of inclusion have moved away from the idea of integration — a passive process of simply guaranteeing the physical presence of children with additional needs in a mainstream classroom. Instead, inclusion in modern educational discourse is an intrinsic rather than extrinsic process, concerned with creating the conditions that allow all children to become full and active participants in their education (Fisher, 2012). In recent years, debates around the need for, and aims of, inclusive education have expanded to encompass children from different cultural, ethnic and linguistic backgrounds; children from lower SES households; and children with different learning strengths and styles who may have struggled in the more traditional, didactic classrooms of the past (Peters and Oliver, 2009; Florian, 2010; Cosier, 2010). In this dissertation, the researcher explores links between low SES and lower literacy attainment levels, and the ways in which initiatives and interventions designed to close the attainment gap can contribute to the successful delivery of inclusive education in the classroom.

Socio-Economic Status (SES)

In undertaking a study that explores the efficacy of literacy interventions for a more inclusive classroom, the researcher examined the factors that necessitated such interventions. Initial readings suggested that many factors can correlate with lower levels of literacy attainment in early primary education and that, often, these factors are interconnected and interdependent (Hemmerechts, Agirdag and Dimokritos, 2017). These factors include, but are not limited to, parental educational experiences, attitudes to reading in the home, the language spoken in the home, gender, SENs and SES (Kennedy et al., 2012). While the pertinence and impact of these factors vary in different jurisdictions and education systems, those aforementioned are identified as the most relevant in the Irish context (Kennedy et al., 2012). SES is of particular significance, as it overlaps and interacts with several other correlating factors (Curtin et al., 2016).

In the European Literacy Policy Network-commissioned report *Literacy in Ireland: country report — children and adolescents* (2016), Curtin et al. (2016) undertook a comprehensive study of literacy attainment within the Irish education system. Although the Irish education system was found to have performed well in comparison to EU averages, students from low-SES backgrounds were identified as being vulnerable to lower literacy and educational attainment in comparison to their peers from medium- and high-SES backgrounds (ibid.). Ireland's performance in this area was much closer to the EU average. According to Curtin et al. (2016, p.7), there is 'clear evidence of underperformance among students of low socioeconomic status'. They recommend that steps be taken to ensure that these students are given the opportunity to develop their literacy abilities to a level that allows them to access the full curriculum (ibid.). This illustrates that targeted literacy interventions and initiatives should play an important part in addressing socio-economic disadvantage in primary schools, which, in turn, would create spaces for a more inclusive classroom.

Early Literacy

Literacy and numeracy are viewed as the cornerstones of primary education. In the Irish context, numeracy and literacy were at the centre of the government's primary education policy demonstrated in the launch of the 2011 *National strategy to improve*

*literacy and numeracy among children and young people (*DES, 2011). While definitions of literacy have expanded over time to incorporate areas such as technological literacy, physical literacy and emotional literacy, for the purposes of this study, the researcher focused on the definition of literacy of Pilgrim and Martinez (2013) that centres on the ability to understand and express information through the development of reading, writing and oral language skills. Though this functional view of literacy may be viewed as overly narrow by some stakeholders in education, a measurable definition was necessary for this integrative literature review. The researcher gives due regard, however, to the multi-faceted nature of early literacy learning, as well as other forms of literacy, insofar as they interact with literacy attainment.

Defining what is meant by 'early literacy' is another principal task in setting the foundations for this research area. Though the term 'early literacy' can at times encompass a wide range of ages, the idea that it refers to the development of skills that students need in order to transition from learning to read to reading to learn is a commonality in educational research (Kennedy et al., 2012). Early literacy is defined as the period in which the child acquires the foundational skills of phonological awareness, vocabulary acquisition, and letter and word recognition that will be the basis for all future learning (Raban and Scull, 2013). For the purposes of this study, early literacy is defined as the years between four and eight. In the Irish context, this age range would, in general, comprise the child's entry into primary education to their third or fourth year in school. The researcher chose this age range as it goes beyond the target age for the delivery of several commonly utilised literacy interventions, allowing for an examination of their efficacy in delivering a more inclusive classroom in the short, medium and long term. Two research questions were formulated to inform the ILR, namely:

1. How does socio-economic disadvantage impact on early literacy attainment in primary schools?
2. How do current literacy interventions and initiatives contribute to the creation of an inclusive classroom environment?

Methodology

A documentary research approach was adopted to explore and address the stated research questions. Documentary research has numerous advantages that include the accessibility of data, the comparatively small amount of time and resources required to undertake the data collection process, and the non-reactivity of the data collected for analysis; that is, the data itself cannot be biased by the data collection process (Briggs, Morrison and Coleman, 2012). This type of research has disadvantages, however, in that the potential for limited research on the particular research topic at hand is a risk, along with the potential for mistakes or inaccuracies in the primary sources to occur. The potential for the source research to be analysed and applied outside the context of its original purpose could also be problematic (Appleton and Cowley, 1997). It is therefore the responsibility of the researcher to ensure that steps are taken to safeguard quality and transparency throughout the research project. Documentary research was suitable for this dissertation as the preliminary scoping undertaken uncovered a wide variety of relevant material that was suitable to explore the efficacy of literacy interventions in contributing to the creation of an inclusive classroom environment.

An integrative literature review (ILR) is a specific type of documentary research. According to Jesson, Matheson and Lacey (2011, p.9), a literature review can be viewed as a 'research method in its own right', meaning that it can, on its own, form a valid independent research project. The process for conducting an integrative review outlined by Cooper (1998) is well known and widely accepted as best practice in the field of social and educational research. The process follows five steps: problem formulation, data collection or literature search, evaluation of data, data analysis, and interpretation and presentation of results (Russell, 2005). The specific process followed by the researcher in undertaking this integrative review is detailed below.

Step One — Problem Formulation

The integrative review process in this dissertation started with the selection of a research topic — inclusion and the need for inclusive practice in addressing socio-economic disadvantage in primary education. The researcher explored the topic in greater depth, and a broad research problem was formulated with the support of a supervisor. Following this problem formulation, the researcher undertook further topic scoping and examined relevant research material and policy publications. The researcher then formulated the specific research questions that would inform the study.

Step Two — Literature Search, and Step Three — Evaluation

Resultant from the initial background reading and problem formulation, several terms were chosen as being required for the further literature search. These were inclusion, literacy, socio-economic status, disadvantage, intervention, and primary school. Variations of these terms were also used to refine the search. These search terms were applied, in a variety of configurations, using Boolean logic. A sample search string used is given below:

> [{"inclusi*"} AND {"literacy" OR "reading" OR "reading level*"} AND {"socio-economic status" OR "socioeconomic status" OR "SES" OR "disadvantage"} AND {"intervention" OR "initiative" OR "program*"} AND {"primary school" OR "elementary school" OR "national school"}]

Four databases were used in searching for relevant literature: ERIC, Education Source, Academic Source Complete, and Taylor and Francis. In order to meet the basic requirements for initial consideration, the research was confined to articles from these databases that were published in peer-reviewed journals from 2011 to 2022. These criteria were applied to ensure that the research was from credible sources and would provide the latest research data in the field. Articles that met the criteria for initial consideration were then further reduced by the examination of their titles and abstracts. To determine which articles would ultimately form the basis for the literature review, the researcher evaluated the remaining articles according to specific criteria, which were as follows:

1. Relevance to the chosen topic and specific research questions
2. Sufficient clarity with regards to the methodological approach used
3. Appropriate levels of detail regarding the background of the study

4. Detailed information about sampling, both in terms of inclusion of participants and sample size
5. Adequate detail on the process of data analysis
6. Explicit discussion of both the applicability and the limitations of the research

The researcher read 38 abstracts and 24 articles and then selected 12 for final inclusion. Table 1 below gives a breakdown of the search and evaluation process.

Table 1: Search and Evaluation Process for Selected Papers

Database	Records Screened	Abstracts Read	Articles Read and Evaluated	Articles Selected
ERIC	38	11	6	3
Education Source	53	18	12	7
Academic Search Complete	12	4	2	0
Taylor and Francis	15	5	4	2
Total	**118**	**38**	**24**	**12**

Step Four — Analysis, and Step Five — Presentation

To begin the analysis process, a summary table was created. Within this table, the most important information from the twelve articles was presented, including the background and purpose of the research, the methodological approach and methods used, the sample used, and a synopsis of the findings. The selected research papers were read a number of times to continue improving the researcher's knowledge and understanding of their content, after which, a comprehensive thematic analysis was undertaken using Braun and Clarke's (2006) approach. The researcher was careful to ensure that their chosen research questions remained central to the thematic analysis. Preliminary ideas and codes were generated, which were then synthesised to form larger themes. From there, the researcher mapped the themes to the entire selection of documents so as to ascertain applicability to each study. Each theme was then explored on its own to assess ways in which it could be used to communicate the data and findings of the selected documents and, in doing so, help to create a 'story' that would address the research questions of this study.

Data Analysis

The twelve papers selected for inclusion in this study are drawn from a range of peer-reviewed journals focused on literacy, education, inclusion and social disadvantage. All of the articles were published between 2011 and 2022 to ensure maximum relevancy. The sample is comprised of five quantitative studies, four qualitative studies, and three mixed-methods studies. Research on the topic of early literacy attainment with a specific focus on SES and inclusion is limited in the Irish context. For this reason, only three of the selected papers were drawn from the Irish educational research body. The rest were drawn from the Australian, US, Belgian and UK educational jurisdictions. However, these studies focused mainly on the general aspects and components of early literacy, as well as globally utilised interventions such as Reading Recovery, as opposed to specific local

curricula. As such, the findings should be generalisable and applicable in the Irish primary context. Of the qualitative studies, questionnaires and semi-structured interviews were the most frequent method of data collection, typically followed by some form of thematic analysis in keeping with Braun and Clarke's (2006) methodology. The mix of quantitative, qualitative and mixed-method studies selected gave the researcher a rich base of knowledge to build upon in this dissertation. A summary of the twelve selected articles, detailing the author, purpose, methodologies, sample and findings, is presented in Table 2 below.

Table 2: Summary of Selected Papers

	Author	Purpose	Methodology	Sample	Findings/Summary
1.	D'Agostino and Harmey (2016)	To examine the overall effect of Reading Recovery (RR) on students' literacy achievement; the factors that mediate the immediate Reading Recovery effect; and the sustained effect of Reading Recovery on students' literacy achievement	Quantitative meta-analysis — hierarchical linear modelling (HLM) - analysis to evaluate the results of 16 quantitative studies	16 studies from five different educational jurisdictions — 9 experimental and 7 quasi-experimental	59 Reading Recovery effect overall on literacy putting RR in the 91st percentile of literacy interventions. Strongest in the areas of print knowledge and text reading. RR effect diminishes over time, becoming negligible by 3rd grade. Difficult to disentangle factors mediating the effects of the intervention, e.g. SES of participants, location of school, teacher experience
2.	Drewry, Cumming-Potvin and Maor (2020)	To examine ways to facilitate meaningful literacy learning for students experiencing challenges in print-based, classroom activities, using theories of multi-literacy	Qualitative case study — semi-structured interviews, classroom observations and work samples	1 Year 6 student (age 11) in an Australian primary school	The multi-modal literacy programme showed promising results; the student, who previously struggled with traditional writing and reading tasks, engaged enthusiastically with digital tools (audiobooks, iMovie, Wattpad) and showed a deeper capability for meaning-making and self-motivation than before the intervention.

3.	Ellis and Rowe (2020)	To examine the efficacy of *The Strathclyde Three Domains Tool* in narrowing the attainment gap linked to poverty	Mixed-methods study — standardised testing, semi-structured interviews and surveys	12,783 students (age 5–12) in 48 Scottish primary schools	The intervention was observed to provide gains to all student cohorts. The greatest gains were made by low-achieving students from low-SES backgrounds, meaning that it successfully narrowed the attainment gap linked to poverty.
4.	Ferguson, Currie, Paul and Topping (2011)	To examine the impact of a two-year literacy programme on literacy attainment and spelling levels in socio-economically disadvantaged early primary students	Quantitative study — standardised tests to assess progress in spelling, comprehension, text reading and word reading	480 students (age 5–6) in 16 socio-economically disadvantaged Scottish primary schools	Children's attainments in word reading, spelling and reading comprehension were significantly improved as a result of the intervention. This was true not only at the end of the intervention, but at follow-up one and two years later.
5.	Fisher (2012)	To examine the effects of a move from extrinsic to intrinsic inclusion through the implementation of an inclusive literacy programme	Mixed-methods study — standardised testing, pupil questionnaires and interviews, staff interviews	257 students (age 6–10) across 4 year groups in a large, urban English primary school	The study yielded positive quantitative and qualitative results. There were statistically significant gains made by the weakest students — less so in the other cohorts, although they made gains also. Students responded positively in interviews, particularly to the universality of the programme; no child singled out as different to their peers.
6.	Hempel-Jorgensen, Cremin, Harris and Chamberlain (2018)	To examine how reading for pleasure pedagogies impact reader motivation and reader self-concept in low-SES primary classrooms	Qualitative case studies — questionnaires, classroom observations, semi-structured interviews	12 focus students (age 9) from 4 socio-economically disadvantaged primary schools	The study found that teachers were struggling to truly instantiate reading for pleasure pedagogies. Researchers observed teachers struggling to move beyond conception of reading as cognitive/skills-based to incorporate the socio-cultural aspects of literacy development. Students responded well in limited opportunities to reading for pleasure pedagogy.

7.	Higgins, Fitzgerald and Howard (2015)	To examine whether Literacy Lift-Off improves students' literacy skills and to determine what impact Literacy Lift-Off has on students' reading self-concept levels	Quantitative study — standardised testing and questionnaires	92 Senior Infant students (age 5–6) in a large suburban Irish primary school	Results showed that while both groups showed significant change on all dependent variables from pre-intervention to post-intervention, those in the experimental group showed significantly more improvement on word attack skills, word reading and reading self-concept beliefs.
8.	Kennedy (2018)	To examine the impact of Write to Read, a longitudinal collaborative university and school literacy intervention project in disadvantaged schools	Qualitative study — teacher questionnaires, pupil surveys and interviews, teacher and principal interviews	Staff and students at three disadvantaged co-educational Irish primary schools. Schools vary in size (small: <100 to large: >250) and numbers of English language learners (from 23% to 12%).	Findings suggest that engagement is a multidirectional construct, as children's engagement in the mixed-ability groupings within a socially stimulating dialogic environment motivated children to read and participate in the group. Motivation did not precede engagement. A dual emphasis on motivation/engagement and cognitive skills for literacy development within a balanced literacy framework are effective in building children's motivation and engagement and are particularly important for children in high-poverty contexts.
9.	Mehigan (2020)	To examine the effects of an intervention, based on fluency-oriented reading instruction (FORI), on the reading self-efficacy, reading orientation, and perceived difficulty of reading of struggling readers.	Mixed-methods study — questionnaires and semi-structured interviews with teachers and parents and conversational interviews and surveys with students	15 First Class students (mean age of 6 years, 10 months) drawn from 3 urban disadvantaged schools in North Dublin	The FORI intervention had a positive impact on the motivation for reading of struggling readers in First Class. In particular, the intervention was found to decrease students' perceived difficulty with reading and increase their reading self-efficacy and orientation towards reading.

10.	Ng (2018)	To examine how student voice can be used to promote reading engagement and raise outcomes for economically disadvantaged students	Qualitative case study — teacher interviews, student interviews, classroom observations, meeting records	1 teacher and 23 Year 5 students (age 10–11) in a disadvantaged Australian primary school setting	Improvements were shown in a number of areas, including persistence, student collaboration, pupils' reader self-concept and pupil engagement in reading activities.
11.	Schechter, Macaruso, Kazakoff and Brooke (2015)	To examine the potential benefits of a blended learning approach on the reading skills of low socioeconomic status students in Grades 1 and 2	Quantitative study — standardised testing	83 students (mean age of 7) in a disadvantaged, urban US elementary school	Results showed significantly greater post-test gains on a standardised reading assessment for the treatment students compared to the control students. The greatest discrepancy occurred in reading comprehension. A sub-analysis of low-performing English language learner students in the treatment group revealed the largest reading gains. At post-test, these students performed at the level of non-English language learner students in the control group. Results indicated a blended learning approach can be effective in enhancing the reading skills of low socioeconomic students
12.	Thomas, Colin and Leybaert (2019)	To examine the effects of an interactive reading intervention programme on the narratives of children from a low SES, on macrostructural and microstructural parameters	Quantitative study — standardised testing	259 students (age 4–5) from 8 socially disadvantaged Belgian primary schools	The results did not highlight a significant difference between groups concerning the macrostructural parameters. However, microstructural parameters improved significantly in the experimental group with regards lexical, discursive and sentence components.

Findings and Discussion

Following a comprehensive thematic analysis of the selected papers, using Braun and Clarke's (2006) approach, three main themes emerged. These were: the need for a multi-faceted approach to literacy learning to include the socio-cultural dimensions of learning, the scope for different methods of inclusion to be utilised in Irish primary classrooms, and the need to move beyond the so-called Pedagogy of Poverty (Hempel-Jorgensen et al., 2018). Each theme was critically reviewed by the researcher before being fully explored and contextualised with reference to the selected studies as well as the wider educational research and policy context.

Socio-Cultural Dimensions of Literacy Learning

Ellis and Rowe (2020) posit that an emphasis on three dimensions of literacy learning is required for the creation of an inclusive learning environment. These are the cognitive, social and cultural dimensions. The cognitive dimension is concerned with the development of the intellectual skills of literacy learning. The social dimension recognises literacy as a social practice and highlights the need for learners to acquire the social and cultural norms of literacy that are assumed and transmitted by educators and schools (Smith, 2010). The cultural dimension recognises the learner as an individual with a cultural background and identity that is unique to them. It emphasises the necessity for the learner to develop a positive self-identity as a reader and writer (Lareau, 2011). The importance of the latter two dimensions in early literacy education, which are being defined as the socio-cultural dimensions for the purposes of this study, was a recurring theme across the twelve selected articles. As mentioned above, Ellis and Rowe's (2020) research focuses on the balancing of the cognitive dimension with the socio-cultural dimensions in literacy learning and emphasises how, for a truly inclusive literacy programme to be successful, educators must weave literacy into both the hidden and overt curriculum and reposition it as '…a cultural and social practice in school' (Ellis and Rowe, 2020, p.423).

The study examines the correlation between poverty and low literacy attainment and explores the pedagogical merit of a literacy intervention designed to enable 'inclusive literacy teaching that delivers social justice and narrows the attainment gap associated with poverty' (Ellis and Rowe, 2020, p.418). The findings provide cautious optimism that a move towards a broader definition of literacy education that incorporates the socio-cultural dimensions in a meaningful way can help to improve pupils from all backgrounds while narrowing the attainment gap associated with economic disadvantage (Ellis and Rowe, 2020).

The socio-cultural dimensions of literacy learning were also a notable theme of the Irish research articles selected for analysis. Mehigan (2020) and Kennedy (2018) both explore issues pertaining to motivation, orientation to reading and reader self-concept, all of which fall within the socio-cultural dimensions. These papers were particularly relevant as both were carried out in 'disadvantaged' or 'high-poverty' Irish primary school settings. The socio-cultural dimension of literacy learning is of particular importance to educators in disadvantaged contexts, as Mehigan (2020, p.1) asserts:

> *…aspects of reading have been shown to contribute unique variance to reading achievement, and differences in reading attitude and motivation have been implicated in the socioeconomic gaps in reading achievement found consistently worldwide.*

Often, students in these contexts begin their educational journeys not only with less experience as readers than their more advantaged peers, but also with more negative orientations to reading and weaker reader self-concept (Petscher, 2010). Though the precise cause of the early literacy attainment gap can be difficult to pin down, parental orientations to reading and the home literacy environment can have a major impact on both the cognitive and the socio-cultural dimensions of early literacy learning (Nag et al., 2019). Additionally, early experiences and beliefs about one's own reading ability can have a lasting influence on the likelihood of becoming a successful reader in later years (Nag et al., 2019). As such, it is important that early literacy interventions that aim to deliver truly inclusive literacy education focus explicitly on all dimensions of literacy learning and not merely on the technical skills of the cognitive dimension. Both Mehigan (2020) and Kennedy (2018) found that by implementing literacy interventions with an explicit focus on the affective aspects of reading and writing, students' orientation towards reading and reading self-efficacy increased while their perceived difficulty of literacy activities decreased. This is crucial, as these changes can have a positive effect on the development of the cognitive skills associated with decoding text and creating meaning (Luke et al., 2011). The work of Higgins et al. (2015) is also worth noting in this regard, as their research into the efficacy of Literacy Lift-Off found that the intervention provided notable gains in both the cognitive and socio-cultural dimensions; significant improvements were made by students in 'word attack skills, word reading and reading self-concept beliefs' (Higgins et al., 2015, p.247). This is of particular relevance to this study, as Literacy Lift-Off, along with Reading Recovery from which it is adapted, is among the most common literacy interventions delivered in Irish primary classrooms today (NEPS, 2019). This has favourable implications for the ability of current literacy interventions and initiatives to contribute to the creation of inclusive classroom environments, the question of which was set out as one of the primary research aims of this study.

Methods of Inclusion: Multiliteracy Pedagogy

While a model of intrinsic inclusion provides schools and education communities with an overarching framework in which they can operate, it can be difficult to translate this philosophy into everyday classroom practice. Even teachers explicitly attempting to implement literacy pedagogies that fall within the framework of intrinsic inclusion can find it difficult to break away from ingrained ideas about standardised definitions of ability and deficits (Hempel-Jorgensen et al., 2018). A key theme that became apparent upon analysing the selected research papers was the theory of multiliteracies as a pedagogical method of inclusion in modern classrooms (Drewry et al., 2019). Multiliteracy pedagogy reconceptualises literacy education to reflect the changes brought to modern classrooms by globalisation and advances in communication technology (Cope and Kalantzis, 2009). Within multiliteracy pedagogy, the definition of literacy is broadened beyond the traditional focus on knowledge and skills, with literacy diversity and multimodal methods of representation and expression receiving increased emphasis (Mills, 2009). This method of practice moves away from previously accepted conceptions of teaching and learning that centre the teacher as the owner and transmitter of knowledge, and instead highlights the need for students to draw on and develop their

own semiotic literacy abilities to create, represent and express meaning (The New London Group, 1996). This is very much in keeping with the principles of an intrinsic model of inclusion.

Drewry et al. (2020) present a compelling case study showing the utility of technology as a means of instantiating multiliteracy pedagogy in a primary classroom. The study focuses on a single student with significant reading and writing difficulties who attends a primary school in a low-SES urban area. The pupil, Hannah, struggles with print-based literacy activities and, as a result, displays poor engagement and motivation during such tasks. Through the implementation of a multi-modal literacy programme, Hannah, along with her peers, is given the opportunity to use technology to assist her in the completion of a literacy task — reading a book and preparing a report to be presented to the class. To enhance the learning, Hannah and her class are given access to an audiobook version of the book, as well as the iMovie application, which they use to storyboard and create their book report presentation. The findings of the study show that not only does Hannah's motivation and orientation to literacy tasks improve, but that her ability to interpret and create meaning from the book operates on a deeper level to what she had displayed previously in traditional print-based literacy tasks (Drewry et al., 2020). While there are questions surrounding professional development requirements and availability of resources when planning this type of technological integration, it is clear that when integrated in a purposeful, intentional way, technology can have a major part to play in the implementation of inclusive literacy practices in the primary classrooms of the present and future.

Moving Beyond a Pedagogy of Poverty

The theory of Pedagogy of Poverty (PoP), originally explored by Haberman (1991), highlights the diminished pedagogical methods employed by educators in low-SES urban education settings. Though Haberman's (1991) original work focused on US schools, research evidence from around the world suggests that PoP is a phenomenon common to a large variety of educational jurisdictions (Lingard, 2007; Hayes et al., 2009; Mills and Gale, 2010; Thadani et al., 2010; Waxman et al., 2010; Smyth et al., 2013). Notable features of PoP include strong teacher presence, passive positioning of students in the learning process, heavy emphasis on student compliance and teacher-set activities, lack of student voice, and little regard given to the socio-cultural dimensions of learning (Lingard, 2007). It should be noted that Haberman (1991) does not place the blame for this phenomenon with teachers, but instead posits that it occurs due to a culture that reproduces a set of entrenched beliefs and pre-existing biases regarding the nature and needs of students in low-SES urban contexts.

Hempel-Jorgensen et al. (2018) present a case study of teachers attempting to utilise a Reading for Pleasure pedagogy in a low-SES context as a means of moving away from PoP. Despite the explicit aims of the study, three of the four participating teachers struggled to make meaningful changes to their pedagogy. They had trouble letting go of the control associated with teacher-led pedagogy and failed to genuinely incorporate student voice and agency into their teaching (Hempel-Jorgensen et al., 2018). This helps to shed light on the difficulty teachers face in attempting to unlearn habits and practices built up over years and shows that moving away from PoP requires buy-in from the whole educational community; it will not be achieved by individual teachers alone

without significant investment, resources and professional development (Hayes et al., 2017).

In contrast to the above study, Ng's (2018) research shows how, in low-SES settings, meaningful incorporation of student voice into early literacy education can help teachers achieve genuine inclusion and go a long way towards eradicating PoP in their everyday practice. The article presents a case study in which a teacher in a low-SES primary school instantiates a literacy pedagogy with student voice at its core. Students are consulted about, and given agency over, decisions that would traditionally have been the remit of the teacher alone. These include everything from the physical layout and groupings used during reading lessons to the material to be read throughout the year. The study documents the uncertainty of not only the teacher but the students as well as how they find their footing within the new classroom dynamics (Ng, 2018). However, over time, teacher and students alike become more comfortable and confident, and the findings show that the programme led to improved outcomes across a variety of metrics, including persistence, student self-concept, student perception of difficulty, and general reading levels (Ng, 2018).

Conclusion

This study has highlighted a strong correlation that exists between low SES and low levels of early literacy attainment. Though the exact causes of this correlation are difficult to identify in isolation, it is clear that this is an issue that must be addressed in Ireland and around the world. While the root causes of the attainment gap may be most effectively addressed through social policy at a societal level, the education community has a responsibility to find what solutions they can in the meantime. Through the ILR process, the researcher has identified interventions aimed at addressing this attainment gap, ranging from internationally available programmes such as Literacy Lift-Off and Reading Recovery to specially designed small-scale initiatives exploring specific concepts like motivation, reader self-efficacy and multi-literacies. Having critically assessed each intervention individually, the researcher has determined that, to varying degrees, they go some way to addressing the attainment gap; as such, it can be concluded that current literacy interventions and initiatives can be successful in contributing to the creation of an inclusive classroom environment.

References

Appleton, J.V. and Cowley, S. (1997) 'Analysing clinical practice guidelines: a method of documentary analysis', *Journal of Advanced Nursing*, 25(5), pp.1008–1017.

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp.77–101.

Briggs, A.R.J., Coleman, M. and Morrison, M. (2012) *Research methods in educational leadership & management*. 3rd edn. London: Sage Publications.

Cooper, H. (1998) *Applied social research methods. Synthesizing research: a guide for literature reviews*. 3rd edn. New York: Sage Publications.

Cope, B. and Kalantzis, M. (2009) '"Multiliteracies": new literacies, new learning', *Pedagogies: An International Journal*, 4(3), pp.164–195.

Cosier, M. (2010) *Exploring the relationship between inclusive education and achievement: new perspectives*. PhD thesis. Syracuse University.

Curtin, A., Hall, K., Kennedy, E., Shiel, G., Garbe, C. and Lafontaine, D. (2016) *Literacy in Ireland — country report*. [Online] Available at: https://epale.ec.europa.eu/sites/default/files/literacy_in_ireland_elinet_report_march_2016.pdf (Accessed: 14 April 2022).

D'Agostino, J.V. and Harmey, S.J. (2016) 'An international meta-analysis of Reading Recovery', *Journal of Education for Students Placed at Risk (JESPAR)*, 21(1), pp.29–46.

Department of Education and Skills (DES) (2011) *The national strategy to improve literacy and numeracy among children and young people*. [Online] Available at: https://assets.gov.ie/24521/9e0e6e3887454197a1da1f9736c01557.pdf (Accessed: 14 April 2022).

Department of Education and Skills (DES) (2021) *Overview of education 2000–2020*. [Online] Available at: https://www.gov.ie/en/publication/055810-education-statistics/#latest-statistical-reports (Accessed: 14 April 2022).

Drewry, R.J., Cumming-Potvin, W.M. and Maor, D. (2019) 'New approaches to literacy problems: multiliteracies and inclusive pedagogies', *Australian Journal of Teacher Education*, 44(11), pp.61–78.

Ellis, S. and Rowe, A. (2020) 'Literacy, social justice and inclusion: a large-scale design experiment to narrow the attainment gap linked to poverty', *Support for Learning,* 35(4), pp.419–439.

Ferguson, N., Currie, L., Paul, M. and Topping, K. (2011) 'The longitudinal impact of a comprehensive literacy intervention', *Educational Research*, 53(3), pp.237–256.

Fisher, H. (2012) 'Progressing towards a model of intrinsic inclusion in a mainstream primary school: a SENCo's experience', *International Journal of Inclusive Education*, 16(12), pp.1273–1293.

Florian, L. (2010) **'**Preparing teachers for inclusive education: using inclusive pedagogy to enhance teaching and learning for all', *Cambridge Journal of Education*, 40(4), pp.369–386.

Haberman, M. (1991) 'Pedagogy of poverty versus good teaching', *Phi Delta Kappan*, 73(1), pp.290–294.

Hayes, D., Hattam, R., Comber, B., Kerkham, L., Lupton, R. and Thomson, P. (eds.) (2017) *Literacy, leading and learning: beyond Pedagogies of Poverty*. London: Routledge.

Hayes, D., Johnston, K. and King, A. (2009) 'Creating enabling classroom practices in high poverty contexts: the disruptive possibilities of looking in classrooms', *Pedagogy, Culture & Society*, 17(3), pp.251–264.

Hemmerechts, K., Agirdag, O. and Kavadias, D. (2017) 'The relationship between parental literacy involvement, socio-economic status and reading literacy', *Educational Review*, 69(1), pp.85–101.

Hempel-Jorgensen, A., Cremin, T., Harris, D. and Chamberlain, L. (2018) 'Pedagogy for reading for pleasure in low socio-economic primary schools: beyond "Pedagogy of Poverty"?', *Literacy*, 52(2), pp.86–94.

Higgins, E., Fitzgerald, J. and Howard, S. (2015) '"Literacy Lift-Off": an experimental evaluation of a Reading Recovery programme on literacy skills and reading self-concept', *Educational Psychology in Practice*, 31(3), pp.247–264.

Jesson, J., Matheson, L. and Lacey, F.M. (2011) *Doing your literature review: traditional and systematic techniques*. London: Sage Publications.

Kennedy, E. (2018) 'Engaging children as readers and writers in high-poverty contexts', *Journal of Research in Reading*, 41(4), pp.716–731.

Kennedy, E., Dunphy, E., Dwyer, B., Hayes, G., McPhillips, T., Marsh, J., O'Connor, M. and Shiel, G. (2012) *Literacy in early childhood and primary education (3–8 years): research report no. 15*. [Online] Available at: https://ncca.ie/media/2137/literacy_in_early_childhood_and_primary_education_3-8_years.pdf (Accessed: 14 April 2022).

Lareau, A. (2011) *Unequal childhoods: class, race, and family life.* 2nd edn. Berkeley and Los Angeles, California: University of California Press.

Lingard, B. (2007) 'Pedagogies of indifference', *International Journal of Inclusive Education*, 11(3), pp.245–266.

Mehigan, G. (2020) 'Effects of fluency oriented instruction on motivation for reading of struggling readers, *Educational Sciences*, 10(56), pp.1–23.

Mills, K.A. (2009) 'Multiliteracies: interrogating competing discourses', *Language and Education*, 23(2), pp.103–116.

Mills, C. and Gale, T. (2010) *Schooling in disadvantaged communities: playing the game from the back of the field*. New York: Springer Science & Business Media.

Milton, M. (2017) 'Literacy and inclusion: current perspectives', *Inclusive Principles and Practices in Literacy Education*, 11(1), pp.3–18.

Nag, S., Vagh, S.B., Dulay, K.M. and Snowling, M.J. (2019) 'Home literacy, school language and children literacy attainments: a systematic review of evidence from low- and middle-income countries', *Review of Education,* 7(1), pp.91–150.

National Educational Psychological Service (NEPS) (2019) *Effective interventions for struggling readers*. [Online] Available at: https://www.into.ie/app/uploads/2019/07/neps_literacy_resource_pack.pdf (Accessed: 14 April 2022).

Navarro, S.B., Zervas, P., Gesa, R.F. and Sampson, D.G. (2016) 'Developing teachers' competences for designing inclusive learning experiences', *Educational Technology & Society*, 19(1), pp.17–27.

Ng, C. (2018) 'Using student voice to promote reading engagement for economically disadvantaged students', *Journal of Research in Reading*, 41(4), pp.700–715.

Obiakor, F., Harris, M., Mutua, K., Rotatori, A. and Algozzine, B. (2012) 'Making inclusion work in general education classrooms', *Education and Treatment of Children*, 35(3), pp.277–290.

Organisation for Economic Co-operation and Development (OECD) (2009) *PISA 2009 assessment framework: key competencies in reading, mathematics and science*. [Online] Available at: https://www.oecd.org/pisa/pisaproducts/46619703.pdf (Accessed: 14 April 2022).

Peters, S. and Oliver, L.A. (2009) 'Achieving quality and equity through inclusive education in an era of high-stakes testing', *Prospects*, 39(1), pp.265–279.

Petscher, Y.A. (2010) 'Meta-analysis of the relationship between student attitudes towards reading and achievement in reading', *Journal of Research in Reading*, 33(1), pp.335–355.

Pilgrim, J. and Martinez, E.E. (2013) 'Defining literacy in the 21st century: a guide to terminology and skills', *Texas Journal of Literacy Education*, 1(1), pp.60–69.

Raban, B. and Scull, J. (2013) 'Young learners: defining literacy in the early years — a contested space', *Australian Journal of Early Childhood,* 38(1), pp.100–106.

Russell, C. (2005) 'An overview of the integrative research review', *Progress in Transplantation*, 15(1), pp.8–13.

Schechter, R., Macaruso, P., Kazakoff, E. and Brooke, E. (2015) 'Exploration of a blended learning approach to reading instruction for low SES students in early elementary grades', *Computers in the Schools*, 32(3–4), pp.183–200.

Smith, V. (2010) 'Comprehension as a social act: texts, contexts and readers', in Hall, K., Goswami, U., Harrison, C., Ellis, S. and Soler, J. (eds.) *Interdisciplinary perspectives on learning to read: culture, cognition and pedagogy.* London: Routledge Psychology in Education, pp.61–73.

Smyth, J., McIinerney, P. and Fish, T. (2013) 'Blurring the boundaries: from relational learning towards a critical pedagogy of engagement for disengaged disadvantaged young people', *Pedagogy, Culture & Society*, 21(2), pp.299–320.

Thadani, V., Cook, M.S., Griffis, K., Wise, J. A. and Blakey, A. (2010) 'The possibilities and limitations of curriculum-based science inquiry interventions for challenging the "Pedagogy of Poverty"', *Equity & Excellence in Education*, 43(1), pp.21–37.

The New London Group (1996) 'A pedagogy of multiliteracies: designing social futures', *Harvard Educational Review*, 66(1), pp.60–92.

Thomas, N., Colin, C. and Leybaert, J. (2019) 'Impact of interactive reading intervention on narratives skills on children with low socio-economic background', *European Early Childhood Education Research Journal*, 27(6), pp.837–859.

Waxman, H.C., Padron, Y.N. and Lee, Y.H. (2010) 'Accelerating the Pedagogy of Poverty in urban schools: unanticipated consequences of the No Child Left Behind (NCLB) Act', *ERS Spectrum*, 28(2), pp.37–43.

Progress Through Collaboration: An Integrative Literature Review Exploring Teachers' Roles in Formative Assessment and Effective Feedback

Pippa Rapoport

Biography

Pippa holds a degree in French Law (1992) from Université de Paris 1 Panthéon-Sorbonne and a Diplôme Supérieur d'Etudes Françaises Modernes (1999) from Alliance Française, Kenya. She graduated with a BSc (Hons) in International Studies (2012) from the Open University. Originally from a legal background, Pippa worked in an international law firm in Paris before leaving for Kenya for eight years. While in Africa, she mainly taught French at the Alliance Française in Nairobi. Since returning to Ireland, she has been teaching French both privately and in post-primary schools. Pippa graduated with a Professional Master of Education (PME) from Hibernia College in 2021. She has a lifelong passion for teaching and loves the communicative aspect of working with young people. She is presently working in the Presentation Secondary School in Thurles, County Tipperary.

Progress Through Collaboration: An Integrative Literature Review Exploring Teachers' Roles in Formative Assessment and Effective Feedback, by Pippa Rapoport

Research Supervisor: Dr Maria Mulrooney

Abstract

Engagement with formative assessment is a still emergent classroom practice that is assuming an increasing importance in contemporary teaching classrooms. The practice is somewhat open to diverse interpretations, and its many applications appear diffuse. Formative assessment is not a homogenous concept that yields consistent results but is a complex, subjective process that is dynamic and evolving. Teacher identity assumes a central importance to this practice, but the question of ways in which this supports and utilises formative assessment to its fullest extent is an open one. The necessity for feedback is, however, clearly evident in meeting learner needs and supporting progression.

Keywords: Feedback, formative and summative assessment, concept of assessment literacy, teacher's conceptions

Introduction and Background

The purpose of this dissertation originated from the researcher's observations. While on school placement, the researcher noticed that students were more interested in receiving a grade over written feedback on their corrected work. It was observed that students were less likely to review and consider their feedback regardless of performing well or not on their grades. This observation negates the idea of encouraging students to set their own learning goals in self-assessing towards becoming independent learners. This raises the question as to how teachers can provide effective, meaningful feedback.

Formative Feedback

Formative assessment has its genesis in the seminal work of Black and Wiliam (1998) in exploring different nuances created in the use of feedback and its potential effects on the learner. Wiliam advocated making teaching more responsive to the needs of students in examining various contexts of feedback. Positing that 'good feedback causes thinking' (Wiliam, 2016, p.3), he stressed the important influence of valuable feedback, which should inform the next steps in students' learning. Wiliam strongly advocates making students 'owners of their own learning' (Wiliam, cited in NCCA, 2020, p.15) and focuses on helping teachers with the challenges of incorporating innovative ideas and changing practice.

The exploration of changes to the education system has been an enduring one and centres on the primary role of Assessment for Learning and the ways in which best

practice might be achieved. This includes the pivotal contributions of the Organisation for Economic Co-operation and Development (OECD)/Centre for Educational Research and Innovation (CERI) international conference in 2008, which focused on how formative assessment can contribute to meeting goals for lifelong learning, raising levels of student achievement through building learning skills, and the acquisition of critical thinking tools (OECD, 2008). Formative assessment also promotes the practice of inclusivity and high equity, wherein all learners have a place within the school system. Challenges to this innovative approach to learning exist in the tension that exists with more traditional summative assessments. This initial exploration of the subject of formative assessment prompted the following research questions:

1. How influential are teachers' attitudes and perceptions of formative assessment in the use of feedback?
2. How do teacher assessment literacy and teacher assessment identity address the challenges of formulating and adapting feedback suitable for student needs?

Methodology

The dissertation employs an integrative literature review (ILR) that attempts to draw together a wide range of literature in the domain of formative assessment. It therefore critiques, wherever possible, the role of the teacher in disseminating effective feedback as part of the wider remit of formative assessment. The aim of the thesis further attempted to identify spaces where the use of effective feedback has proved successful while also acknowledging current limitations. An ILR intends to 'summarise what is known about a topic and communicate the synthesis of the literature to a targeted community' (Toronto and Remington, 2020, p.1). A literature review may be understood as a close survey of a varied range of scholarly sources related to a specific topic. Traditionally, most documentary research in social and educational domains has been concerned with historical or archival research (Cohen et al., 2010).

The literature review has a number of major threads, one of which is an integrative approach wherein the information is woven into other research, such as will be used in this study. The integrative parameters include the combination of both qualitative and quantitative research with the addition of theoretical material to provide a better insight into the literature review. Research is employed to inform specific practices by exploring the evidence presented in the research (Toronto and Remington, 2020). The integrative approach employs a 'non-experimental design, systematic approach and detailed search strategy to identify relevant evidence that answers a targeted question' (Noble and Smith, 2018, p.3). A closer examination of this literature has consequently deepened the researcher's own understanding of the subject and enhanced their professional practice.

Table 1: Sample Search String

Database/Source	Records Screened	Abstracts Read	Articles Read/Evaluated	Included
Education Source	64	20	7	1
Academic Search complete	46	15	8	0
ERIC	220	56	10	5
Taylor and Francis	131	50	30	6
Total	461	141	55	12

Table 2: Summary of Selected Papers

	AUTHORS	PURPOSE	SAMPLE	METHODOLOGY	FINDINGS/SUMMARY
1	Looney et al. (2017)	An exploration of teacher assessment identity, including teachers' perceptions of their role as assessors and the influence this has on their assessment criteria	28 self-report scales related to teacher assessment practices, aligned to conceptual framework	Qualitative Review of teacher assessment literacy; framework coding; existing scales used to develop final coding scheme	Existing scales and related research into strategic and technical assessment skills as demonstrated by teachers are considered to be somewhat limited in scope. Reconceptualisation of these skills must take into account further, unexamined complexities.
2	DeLuca et al. (2016)	An examination of the variance that exists in teacher approaches to assessment criteria and the contributing factors that influence their decisions. They propose a four-phase model to measure individual teacher assessment standards.	603 teachers from diverse demographic groupings These groupings look at career stage, teaching division and previous assessment education.	Qualitative Surveys from 603 teachers, of which 404 teachers completed the entire survey	There is a nuanced professional impact on teachers', dependent on their career stage, in which they exercise differing concepts and practices of assessment. Assessment literacy is primarily a response to career context. Therefore, further assessment training must be targeted and differentiated for individual teachers.
3	Brooks et al. (2019)	An exploration of which types and levels of feedback are most commonly used in the classroom	28 children (13 females and 15 males) aged between 11 and 13 One teacher	Qualitative research was conducted in a multi-ethnic school — audio voice recordings of all participants and field observations	Task-level feedback was revealed to be the most predominant, with alternative processes and self-regulatory feedback significantly under-utilised.

4	Haug and Ødegaard (2015)	Exploring teacher sensitivity to student thoughts and ideas when engaging with formative assessment. This is measured through a proposed formative assessment framework.	6 teachers	Qualitative — interviews and video recordings	It is important that teachers develop a greater sensitivity to student responses in order to modify learning goals. Further teacher training is considered desirable in order to promote better use of contemporary assessment concepts and practices.
5	Volante and Beckett (2011)	Analysis of teacher interviews to test understanding of particular formative assessment strategies	20 teachers from two different schools	Qualitative — comparison and contrast of interview material	The use and understanding of formative assessment principles were revealed to be somewhat uneven when implemented in the classroom. A wide range of teacher responses indicates that the use and potential of formative assessment is not fully understood.
6	Lysaght and O'Leary (2013)	The development of an AFL audit instrument currently in use in Ireland. This attempts to measure teachers' understanding of AFL practices and the extent to which this is embedded in their teaching.	476 teachers working in a range of classrooms across 36 Irish schools	Quantitative — psychometric properties of 4 scales	Two conclusions are proposed. Current measurement scales are fit for purpose. The findings contribute to existing data from national agencies. It additionally contributes to the formative assessment practices of teachers in Ireland.
7	Bergeron (2020)	An examination of high school teachers' beliefs about collaboration, their rationale for using common formative assessments and the characteristics that explain these relationships	76 middle school teachers from two schools	A parallel mixed-method design was used to collect both qualitative and quantitative data.	Teachers identify many benefits to collaboration, especially improvements to their teaching through discussions and the feeling of support generated by shared practice. Exchanging ideas in various media (email or informal chats) constitutes satisfactory collaboration.

8	Ahmed, Ali and Shah (2019)	An investigation into teachers' knowledge of formative assessment and its resultant influence on student grades	Two groups of teachers on the basis of familiarity/ unfamiliarity with student performance. The first group had full knowledge of the classroom performance and were involved in formative assessment. The second group had no familiarity with classroom performance and were unaware of student formative assessment.	Quantitative — paired sample T-tests	Both groups of teachers were asked to mark student papers. The group of teachers who were aware of students' classroom performances were noticed as having higher means values than the teachers who were unfamiliar with the students. External assessors also displayed lower means values. Knowledge of student ability informs appropriate teacher assessment.
9	Alotaibi (2018)	An exploration of the various factors that influence teachers' perceptual differences of formative assessment and the potential barriers to a better implementation of such strategies	25 teachers from 15 different schools 210 fully completed questionnaires	Qualitative — stratified random sampling	Significant differences exist in the implementation of assessment practices between teachers. These disparities are influenced by age, gender and levels of experience. Misconceptions about the role and function of assessment, as well as the need for further teacher training are also highlighted.
10	Kruse et al. (2020)	An investigation into how individual levels of teacher assessment literacy were impacted by specifically designed assessment literacy training	96 pre-service teachers	Quantitative — surveys and scenario-based objective tests	It is considered critical that teachers have access to rigorously designed and targeted assessment training. Existing assessment literacy training would benefit from more effective development strategies.

11	Darmody et al. (2020)	To explore the underlying beliefs about and conceptions of assessment held by post-primary teachers in Ireland at the time immediately following the introduction of a revised policy of assessment by the DES in 2017	586 post-primary teachers reduced to 489	Quantitative — online questionnaire using the eSurveyCreator software. Two forms of volunteer sampling were used.	There are five factors suggested as a hierarchical structure for assessment purposes, as endorsed by the teachers in the study.
12	Devine et al. (2013)	Research documenting experienced teachers' classroom practices and their beliefs on why they teach the way they do	126 teaching staff in 12 participating schools consisting of open discussion on the characteristics of being a good teacher	Mixture of qualitative and quantitative methods; constant comparative method for a 65-item questionnaire	Teachers are being challenged by the increasingly diverse and intensified nature of classroom life. Teacher passion and commitment plays out differently in different contexts. Age and experience shape different strategies in response to rapidly changing economy and society.

Findings and Discussion

Following a detailed analysis of the twelve articles using Braun and Clarke's (2006) thematic analysis model, the research findings have revealed the process of formative assessment to be an extraordinarily complex and multi-layered experience for teachers in their professional practice.

Formative assessment appears to have its admirers as well as its detractors and continues to generate debate and wide-ranging opinion (Alotaibi, 2019). Research has clearly shown that in the classroom environment, formative assessment and its integral use of feedback yields variable results (Volante and Beckett, 2011). Although there appears to be an emerging consensus that formative assessment has the potential to deliver meaningful change and improvements to learners' performance, this is not always guaranteed or fully deliverable due to a number of contextual factors (Wiliam, 2011). While it may be theoretically possible to define these two interdependent concepts by means of clear parameters and identifiable criteria for excellence (Brooks et al., 2019), the real-time experience in the use of these practices has been seen to vary widely from individual to individual and from context to context. Research suggests there is no easily quantifiable gold standard one can refer to when exploring the implications of formative assessment and feedback to promote improved learner performance.

Looney et al. (2017) characterised the effective use of feedback as needing certain criteria for its success. These criteria require that all feedback be unambiguous, easily accessible to the learner, relevant to their learning needs and describe achievable learning goals. Feedback cannot be given in isolation (Hounsell et al., 2008). A point of

note from the research of Volante and Beckett (2011, p.239) suggests that this feedback also must be delivered at the appropriate times within the learning cycle. The implication is that not all teachers have an equal level of skill or experience when using feedback, which leads to an uneven and unpredictable classroom application that can then impact the learner's performance.

Additionally, it appears that there is an intimate, if at moments, uneasy, flow between the use and practice of formative assessment with feedback and the emotional and psychological resonances this brings with it for the teacher, on both personal and professional levels. The successful acquisition of this complex skill undoubtedly requires time and familiarity. It may also imply further professional training and development in order for its successful implementation to take hold and flourish in the classroom, something that not all teachers would seem to welcome. In terms of the Irish context, there appears to be an emerging area of concern for teachers in terms of adapting to rapidly changing socio-economic conditions and the increase in the number of non-national students in classrooms (Devine et al., 2013).

Two influential aspects have been noted to impact on teacher assessment performance. The first is an all-important sense of identity, both as a teacher and as an assessor. This concept of teacher identity is powerfully influenced by individual beliefs, knowledge, skill and range of experience (Bergeron, 2020). In a very real sense, it appears that at some point in their careers, personal becomes professional and it is this inevitable fusion that serves to inform teachers' professional roles as educators (Alotaibi, 2019). The second aspect of note is the concept of assessment literacy and efficacy. This refers to the facility with which the individual teacher is able to introduce and maintain specific assessment practices to encourage enhanced learner achievements (Looney, 2016). Xu and Brown (2016, cited in Ahmed et al., 2019) have highlighted the point that teacher assessment literacy is a profound aspect that must be considered and that teachers' understanding of what constitutes assessment feedback plays a defining role in its efficacy. Looney et al. (2017) are also focused on the significant contributions individual teacher identity make. They examined the concept of assessment literacy, first introduced by Stiggins (1991, cited in Looney et al., 2016). Assessment literacy is broadly defined as assessment knowledge and skills, as used in teacher practice (Popham, 2009; Stiggins, 1995, cited in Looney et al., 2016), as well as the use and interpretation of evidence to 'inform instruction, generate feedback and guide student learning' (Stiggins and Duke, 2008; Webb, 2002, cited in Looney et al., 2016).

Conclusion

This thesis examined the powerful role of feedback in formative assessment classroom practices and the central contributions of the teacher in this domain. The twelve selected papers each contributed useful research into what is clearly a significant, complex, sophisticated and still-emergent development in education. There has also been an examination of the complicated, emotional inter-relationships that arise between teachers' professional and personal identities and what these attitudes and beliefs might mean for individual assessment approaches. The thesis has further explored, albeit briefly, the topic of further professional development in the search for greater facility and integration of these highly complex classroom skills.

Current research suggests that any potential improvements to learner performance result in effective feedback and is very much dependent on the assessor/teacher. It is important that subsequent opportunities be provided to the student to support and encourage the best use of this feedback (Ahmed et al., 2019) to acknowledge diversity in student needs.

Formative assessment may be viewed as a process of collaboration between educator and learner, where both parties may benefit from a participatory learning experience. This collaboration appears to require the individual teacher to develop and maintain a continuous and working knowledge of each learner to subsequently develop a fluid sensitivity to the most favourable manner in which this learner's performance can be improved (Haug and Ødegaard, 2015). Brooks et al. (2019) express interest in how the learner, in turn, engages with their feedback. The implication here is that the teacher must tailor feedback in the best possible manner for the learner to remain sufficiently motivated to capitalise on what has been provided and progress forward to the next learning engagement point.

References

Ahmed, F., Ali, S. and Shah, R. (2019) 'Exploring variation in summative assessment: language teachers' knowledge of students' formative assessment and its effect on their summative assessment', *Bulletin of Education and Research*, 41(2), pp.109–119. [Online] Available at: https://eric.ed.gov/?id=EJ1229441 (Accessed: 04 March 2021).

Bergeron, L. (2020) 'An investigation into the relationship among middle school teachers' beliefs about collaboration, their perceptions of formative assessment and selected teacher characteristics', *Current Issues in Education*, 21(3). [Online] Available at: http://cie.asu.edu/ojs/index.php/cieatasu/article/view/1714 (Accessed: 05 March 2021).

Brooks, C., Carroll, A., Gillies, R.M. and Hattie, J. (2019) 'A matrix of feedback for learning', *Australian Journal of Teacher Education*, 44(4). [Online] Available at: http://dx.doi.org/10.14221/ajte.2018v44n4.2 (Accessed: 07 March 2021).

Darmody, M., Lysaght, Z. and O'Leary, M. (2020) 'Irish Post-Primary Teachers' Conceptions of Assessment at a Time of Curriculum and Assessment Reform', *Assessment in Education: Principles, Policy and Practice*. [Online] Available at: https://www.tandfonline.com/doi/full/10.1080/0969594X.2020.1761290 (Accessed: 07 March 2021).

DeLuca, C. and Klinger, D.A. (2010) 'Assessment literacy development: identifying gaps in teacher candidates' learning', *Assessment in Education: Principles, Policy & Practice*, 17(4), pp.419–438.

DeLuca, C., Valiquette, A., Coombs, A., LaPointe-McEwan, D. and Luhanga, U. (2018) 'Teachers' approaches to classroom assessment: a large-scale survey', *Assessment in Education: Principles, Policy & Practice*, 25(4), pp.355–375. [Online] Available at: https://doi.org/10.1080/0969594X.2016.1244514 (Accessed: 01 June 2021).

Devine, D., Fahie, D. and McGillicuddy (2013) 'What is good teaching? Teacher beliefs and practices about their teaching', *Irish Educational Studies*, 32(1), pp.83–108. [Online] Available at: http://dx.doi.org/10.1080/03323315.2013.773228 (Accessed: 04 March 2021).

Haug, B. and Ødegaard, M. (2015) 'Formative assessment and teachers' sensitivity to student responses', *International Journal of Science Education*, 37(4), pp.629–654. [Online] Available at: https://doi.org/10.1080/09500693.2014.1003262 (Accessed: 02 June 2021).

Kruse, L., Impellizeri, W., Witherel, C. and Sondergeld, T. (2020) 'Evaluating the impact of an assessment course on pre-service teachers' classroom assessment literacy and self-efficacy', *Mid-Western Educational Researcher*, 32(2), pp.107–132. [Online] Available at: https://eric.ed.gov/?redir=https%3a%2f%2fwww.mwera.org%2fMWER%2fvolumes%2fv32%2fissue2%2fV32n2-Kruse-FEATURE-ARTICLE.pdf (Accessed: 03 June 2021).

Looney, A., Cumming, J., van Der Kleij, F. and Harris, K. (2017) 'Reconceptualising the role of teachers as assessors: teacher assessment identity', *Assessment in Education: Principles, Policy & Practice*. [Online] Available at: http://dx.doi.org/10.1080/0969594X.2016.1268090 (Accessed: 07 March 2021).

Lysaght, Z. and O'Leary, M. (2013) 'An instrument to audit teachers' use of Assessment for Learning', *Irish Educational Studies*, 32(2), pp.217–232. [Online] Available at: http://dx.doi.org/10.1080/03323315.2013.784636 (Accessed: 10 March 2021).

Volante, L. and Beckett, D. (2011) 'Formative assessment and the contemporary classroom: synergies and tensions between research and practice', *Canadian Journal of Education*, 34(2), pp.239–255. [Online] Available at: https://eric.ed.gov/?id=EJ936752 (Accessed: 02 April 2021).

An Insight into Play-Based Learning in the Primary School Classroom

Rebecca Ronan

Biography

Rebecca Ronan graduated with a Bachelor of Science (Hons) Degree in Education and Training from Dublin City University. She worked as a Learning, Development and Training Executive for a short time. After graduating from Hibernia College in 2021 with a Professional Master of Education (PME) in Primary Education, Rebecca began her second year of teaching in a local primary school in Dublin. She has a passion and love for play-based learning, which she continues to explore through action-based research approaches as a Junior and Senior Infant teacher. She considers the use of play as affording opportunities for a child-led classroom, where students are encouraged to lead their learning creatively across a range of subjects and programmes. Play-filled classrooms have tremendous benefits, and Rebecca is keen to share these with others.

An Insight into Play-Based Learning in the Primary School Classroom, by Rebecca Ronan

Research Supervisor: Grace Pillay

Abstract

This article critically analyses play-based learning in the primary school classroom, specifically, the impact of play on learning, structured versus unstructured play, and the role of the class teacher during play-based learning experiences. Existing research presents strengths and challenges regarding the implementation of a play-based learning environment. The results of this study demonstrated that when play-based experiences are aligned with curricular aims through a particular style of play, meaningful approaches for teaching and learning in the classroom can emerge that fulfils professional aspirations. Research findings show that educators noted their concerns with regards to a lack of policy and official documentation on ways to implement play. This can impose considerable responsibility on teachers to use their own professional judgement with regard to optimising play experiences. Findings further showed a gap in research regarding the long-term benefits of play on education for the senior classes at primary level. However, with the recent introduction of the *Primary Language Curriculum* in 2016, students at all class levels can engage in various styles of learning, one of which may be play.

Keywords: play, play-based learning, Aistear, structured play, unstructured play, free play, holistic development, teacher as facilitator

Introduction and Background

In 2009, the Aistear framework was introduced by the National Council for Curriculum and Assessment (NCCA), and play-based learning experiences have found a meaningful and worthwhile position in the Irish primary classroom. According to Dodgson (2017), play is a process in which one engages creatively with the world. Martin (2016) understands play to be an experience that enables children to learn and practise skills that are essential for life. Play is a meaningful experience but does not always require measurement unless it is being implemented as a medium of teaching and learning. Riley and Jones (2010) consider that play experiences should be focused on process and participation rather than the outcome. This viewpoint was found to be common among educators in the findings as they felt the benefits of play experiences were overshadowed by pressures to meet academic milestones.

In recent years, play has become a significant part of educational policy around the world with different government bodies forming their own understandings of play and playful learning experiences (Brooker and Edwards, 2010). The Aistear framework encourages various play styles and play-based activities within the classroom that meet

different needs and aims best suited to the specific type of play. Smith (2010) discusses that the following styles of play should occur during a play-based learning experience: social contingency play, sensorimotor play, object play, language play, physical activity play and pretend play. Each of these styles of play is referenced in the Aistear framework (NCCA, 2009) in advising teachers to consider the implementation of these types play in their classroom.

Role of the Teacher in Play-based learning

In educational settings where play occurs, the teacher must consider their role within the play. Lynch (2015) articulates that play-based learning is an important learning style that requires guidance from the teacher to ensure curricular objectives are met appropriately. Lynch (2015) also highlights that regardless of the style of play that occurs, the teacher's role is central in ensuring the play is significant in the development of students. This point mirrors Walsh, McGuinness and Sproule (2019) who state that the role of the teacher is the scaffolder and should guide the play as necessary but in a minimal way. In Aistear documentation (NCCA, 2009), this viewpoint of the teacher is reinforced. The role of the adult within play-based learning is to facilitate the play in ways that enhance the child's learning experiences through scaffolding and modelling behaviour, not explicitly guiding it. It was clear from national and international research that the educator is best situated as the supporter and modeller of the play, and not the instructor.

In the wider literature available on play and, in particular, play-based learning in the classroom within an Irish context, a number of areas of interest emerged that were critically explored. From the Irish perspective, it is evident that play is viewed as a broad concept, that which allows for its implementation to be as effective as possible in the classroom. In regard to playful learning, it is clearly outlined that the class teacher has a role to play in scaffolding the experience, whether the play takes a structured or an unstructured approach. It is also essential to consider that Aistear does not give instruction on the implementation of play-based learning but rather presents suggestions through the form of a guided framework. From the above information and findings, the following questions were established:

1. What impact does play-based learning have on students?
2. Is structured or unstructured play more beneficial for students?
3. What is the role of the class teacher during play-based learning experiences?

Methodology

This research consisted of twelve pieces of existing literature, published between the years 2011 and 2021. The researcher used a documentary research approach to address the research questions and inform the overall research design. Thomas (2013) advises on the importance of knowing which type of data collection will gather the appropriate information that is being sought. When conducting data collection, it was essential for the researcher to acknowledge that qualitative and quantitative data are not opposites to one another but should be used for different purposes at different stages throughout.

When conducting research, Flick (2007) highlights that for the researcher to produce meaningful and accurate findings, they may need to adapt their method to suit what is required within that specific field of study. When conducting education research, primary and secondary research may be implemented in the study in order to obtain a broader view of the data. While a range of different mediums of data collection can provide relevant information, for the purpose of this documentary-style research, secondary data collection was used.

Documentary Research

Document research is conducted by studying, analysing and interpreting the findings of already-existing data from previous studies and areas of research (Scott and Morrison, 2007). Documentary research can be extremely beneficial as the data and the literature already exist and are available to access and implement in the study. However, as documentary research relies upon already-existing studies, gaps in the literature may become apparent and may impact the final results of the research (Appleton and Cowley, 1997). The three research questions were formulated after a period of reading and analysing the literature as data, and the researcher established what specific areas to narrowly focus on.

Integrative Literature Review

The integrative literature review (ILR) is a critical review of the existing literature to formulate new and updated knowledge on a specific area (Torraco, 2016). The use of ILR as a methodology of research has a vast range of benefits, some of which include evaluating the literature and existing findings, highlighting gaps in this research, suggesting future areas of research, linking the theory to reality, creating a research question for the study and evaluating the most suitable approach to the research (framework and/or method) (Russell, 2005).

Data Analysis

When conducting an ILR, Cooper's strategy (1998) is a commonly used method within current literature. The ILR process has five steps: 1) problem formulation, 2) literature search and/or data collection, 3) evaluation of the data, 4) analysis of the data, 5) interpretation and presentation of the results (Whittemore, 2007). Step one — problem formulation — involves highlighting what the research aims to find out. Step two consists of a broad overview of finding literature and/or collecting data that will answer the questions set out in step one. During step three, the researcher considers the data and reads and evaluates the quality of the data to establish its suitability for use. Step four involves the researcher analysing the data before step five, where the data is interpreted and shared through the results.
The ILR process conducted during this study is outlined below:

Step One : Problem Formulation

The integrative review process began by selecting a suitable topic for research — play-based learning. This was selected after engaging with relevant literature in the area and engaging with a supervisor.

Step Two: Literature Search

A high-level reading of the current literature on the topic of play-based learning was completed. The researcher found relevant literature by using the following search terms: play, play-based learning, learning through play and play in the classroom. Reading the literature was the longest stage of this study as there is a significant amount of appropriate material available on play-based learning, both in an Irish and global context.

Step Three: Evaluation of Data/Literature

Once the initial reading had taken place, the researcher had to establish which papers and material would be most suitable to include in the analysis. These papers also were required to meet specific criteria in order to be selected. To collect literature and data, the researcher used two main databases: EBSCOhost and Taylor and Francis. When completing the data collection, it was essential that the selected literature were published between 2011 and 2021. This ensured the most recent, up-to-date literature was included in the study. In total, the researcher found and read 77 pieces of literature on these databases. Thirty three were found on EBSCOhost and forty four were found on Taylor and Francis. The literature was reduced through the consideration of the following criteria:

- The studies were relevant to the research question on play-based learning.
- Enough information was provided in the studies — background, method, data collection.
- The literature was published between 2011 and 2021.
- The researcher of the literature was directly involved with the study.
- The studies focused upon primary education.
- The studies used appropriate data analysis that suited the selected research question.
- Participants were directly involved in primary education (teacher, parent, student, principal).
- The literature included a variety of sample sizes for the studies.
- The literature included various countries to get a global view on play-based learning.
- The aims of the studies differed in order to ensure a more holistic view on play-based learning through the findings.

The following table highlights the screening process.

Table 1: Screening Process for Selected Papers

Database / Source	Records Screened	Abstracts Read	Articles Read/Evaluated	Included
EBSCOhost	33	21	19	3
Taylor and Francis	44	37	23	9
Total	77	58	42	12

Steps 4 & 5: Analysis of Data and Interpretations of Findings

Once the literature being included in the study was established, the researcher critically read and analysed the selected material. The researcher lastly shared the findings through an interpretivist lens as the final step, answering the research questions that were established during stage one.

Table 2: Summary of Selected Papers

	Authors	Purpose	Sample	Methodology	Findings and Summary
1.	Hunter and Walsh (2014)	This study considers play as a teaching and learning pedagogy and considers if play-based learning in the classroom should be reflected within educational policy.	155 Foundation Year teachers completed questionnaires. Observations took place in 8 Foundation Year classrooms — 4 Year 1 classrooms and 4 Year 2 classrooms.	Mixed-method approach: qualitative questionnaires and observations; quantitative formal documentation of the curriculum	Teachers value play in the classroom. Adult involvement in play is essential. Play should be a central part of learning and should be reflected within educational policy. Participants also acknowledged the challenges of play in the classroom — curriculum aims, timing pressures, and policy versus reality.
2.	Nolan and Paatsch (2018)	This study aimed to explore and analyse a newly introduced play-based learning programme at one school in Victoria, Australia.	Two primary school class teachers from Australia. The Early Years Coordinator was also included in the interviews.	Qualitative study: group interviews with three participants at three points during the year — beginning, middle and end	Lack of resources for play proved to be a challenge. Classroom management was essential as two classes were mixed for play. Teacher expectations of behaviour changed during play study. The teachers adjusted their place and role in the classroom during play. Teachers felt challenged with pressures to meet curriculum aims and objectives within play.
3.	Pyle, Poliszczuk and Danniels (2018)	This study aimed to consider how to use play-based learning to ensure meaningful literacy development occurs to meet curriculum aims and objectives.	12 kindergarten teachers (3–26 years' experience) — 6 teachers had participated in previous training on playful learning. 175 students in 12 classes were observed.	Qualitative approach: semi-structured interviews and video data. Each teacher was interviewed. Observation of classrooms took place using video recordings. 10 hours of recordings were required for each classroom.	Direct instruction during play was required for development of literacy skills. Difficulties of unstructured play were highlighted, and teachers were unsure how to implement guided play in the classroom to meet the academic and curriculum requirements and learning objectives, suggesting a need for further guidance.

4.	Martlew, Stephen and Ellis (2011)	This study aimed to explore the creation of a meaningful and effective play-based learning environment, specifically focusing on the experience children have in a play-based learning environment.	Two Scottish local authorities already implementing active learning — six classrooms	Qualitative approach: semi-structured interviews with teachers Observations occurred in the classroom four times. Specific children were also observed.	Play has a significant role in the classroom and can be used effectively. Play supports development of content knowledge and social skills. Teacher scaffolding and intervention should be in place to ensure a higher quality learning experience. Teachers shared positive views on learning through play due to inclusivity for all.
5.	Hunter (2019)	This research aimed to look into play-based learning as an effective teaching and learning strategy, particularly focusing on the role of the teacher and how they can best enhance the learning experience for the students.	30 teachers. The teachers involved had a range of teaching experience — from 1 to 16 years.	Mixed-method approach. Data was collected via questionnaires — multiple choice and open-ended questions allowed for quantitative and qualitative findings.	This research found that more support for teachers is required to implement a play-based learning environment, and encouraging professional development for teachers would enhance these play-based learning experiences. A significant aspect of a successful play-based learning experience is the role the teacher takes.
6.	Breathnach, O Gorman and Danby (2016)	The purpose of this research aimed to explore the understanding of the role play has as a pedagogical approach in prep year from the perspective of parents.	Two studies were conducted. Study 1 focused on parents (no number of parents shared) of students who were in prep year. Study 2 focused on the parents, teacher and students in a collaborative approach in the students' learning.	Qualitative approach — semi-structured interviews were used in both studies.	This study found that parents understood play is a key element to early childhood learning and can be a powerful tool in teaching and learning. The teacher has a vital role in the supporting and facilitating of play.
7.	Fesseha and Pyle (2016)	This study aimed to gain an insight into Ontario teachers' understanding of play-based learning, considering the teachers' own personal thoughts on play and how this can affect the successful implementation of play in the kindergarten classroom.	69 kindergarten teachers participated, with an average of 13 years' teaching experience and 7 years' experience (on average) of teaching kindergarten specifically. 87% of the participants taught in a public setting.	This research was conducted through a 49-question survey. Six questions were about demographics, the rest about play. Six questions were open answer.	This research found that teachers understand and implement play-based learning, but it varies from participant to participant. Educators believe play-based learning has significant benefits and allows for positive results in the classroom. Play-based learning does not have specific guidelines in Ontario, but the guidelines that are available are not realistic or widely followed.
8.	Howe (2016)	This study aimed to research the	Two schools. 11 children were	Qualitative approach.	This study found that children value play-based

		importance of play-based activities in a UK context, considering children's perspectives when they experienced a more content-oriented curriculum and the opportunities for play-based learning were limited.	involved in the study — seven boys and four girls. This study also conducted brief interviews with the parents and practitioners.	Data was collected three times during the academic year. Children took photos that were discussed later. Children drew pictures in response to questions asked. Observations of each child occurred for three hours at the three stages.	learning and activities for personal interests, building social relationships and for enjoyment. Children of all ages prefer to have some control over the learning environment. Educators find meeting academic curriculum demands challenging. Educators of older years do not believe play to be an appropriate learning methodology in order to meet academic aims.
9.	Lynch (2015)	The aim of this research was to investigate the decline in children learning through play in American kindergarten classrooms and why this decline was occurring.	American teachers (limited personal information was available). Participants had a range of 1–15 years' experience. Researcher inferred that the participants taught in public schools due to the discussions.	Qualitative ethnographic approach. Participants shared discussions on 7 teacher message boards over 3 months. There were 78 questions for participants to answer. Message board required prior consideration for validity in findings.	The two main finding of this study were the negative views towards learning through play and the fear of judgement by other teachers the kindergarten teachers felt. Participants were positive in their belief that play had an impact on academic and social learning. However, teachers feel pressure from principals, school stakeholders and policy to be more academically focused instead of play focused.
10.	Colliver and Arguel (2016)	This study aimed to research if an adult's demonstration of play impacted or influenced the child's approach to it, particularly focusing on literacy and numeracy problem-solving skills through play.	Three early childhood learning centres — educators and family members of 4-year-old students participated, 17 parents and their children, and 6 educators	Qualitative approach. Adults received guided videos about literacy and numeracy through play. Teachers observed the child 3–5 times weekly at centre. Interviews were conducted with adults immediately after the study and again three months after the study.	The findings of this study show that there were significant improvements in the children's literacy results from the beginning to the end of the study. The interviews conducted showed an overall positive approach in playful learning, from the perspective of the adult participants, with 81% of the parent participants sharing that their child's interest in literacy or numeracy had increased. This study also found that the attitude of the adult and the role they take in play can impact the learning of the child.

11.	Fitzpatrick, Twohig and Morgan (2014)	This study aimed to research the priorities of primary education going forward, from the perspectives of teachers, principals and parents in Ireland.	960 participants — 719 teachers and 222 parents. Some participants shared that they held various roles such as parent and board of management member, teacher and parent, etc.	Qualitative approach. Participants were asked to share what the purpose/priority of primary education was for them in less than 100 words via an online link.	The key findings of this study were that the development of the child in the following areas are significant priorities of education stakeholders: life skills, communication skills, well-being, literacy and numeracy skills, motivation and engagement, and sense of identity and belonging. To develop these, educators must acknowledge appropriate approaches to teach the curriculum objectives in order to benefit the needs of the students.
12.	Walsh and Fallon (2019)	This research focused on play as a meaningful teaching and learning strategy from the viewpoint of student teachers in Ireland, considering if additional training would impact the play-based learning experience these student teachers engaged in on a later school placement block.	107 final year student teachers — 76 students from Belfast and 31 from Dublin. Only 2 participants were male.	Mixed-method approach: quantitative — questionnaire surveys (pre and post study); qualitative — use of reflective diaries that were written by the participants	The findings of this study showed that play contributes to the holistic development of the child — academically, socially, communication skills and life skills. The majority of participants agreed that the entire curriculum could be taught through a playful learning approach. However, the findings suggested that the participants were generally unsure when asked about the level of adult involvement of play and the directing of play.

Findings and Discussion

The selected twelve papers range from the years 2011–2021. The papers selected include qualitative and mixed-methods studies with interviews, surveys and observations being the main mediums of data collection. The interviews were semi-structured, audio recorded, later transcribed and viewed through an interpretivist lens by the researchers. Those involved in the interviews were teachers and in four studies, parents were included. One study looked at student teachers in their final year of studies. The studies used samples that were small to medium, ranging from 2 to 155 participants and one larger study of 941 participants. The countries included Australia, New Zealand, Canada, USA, UK and Ireland — where play-based learning is implemented in the education systems.

The findings of this research demonstrate an overview of play-based learning across six countries with a focus on the impact of play, both structured and unstructured, and the role of the class teacher in a play-based learning environment at primary level. These

three areas were the main themes that emerged in the critical reading of the literature. Readings showed an overall positive approach to play-based learning, highlighting the impact play has on the holistic development of the child academically, socially and personally. While the researcher aimed to evaluate if structured or unstructured play is more impactful, the findings illustrated strengths in using both styles and how they should be implemented at different times for different purposes, with the role of the class teacher varying depending on the style of play occurring.

Impact of Play

Martlew, Stephen and Ellis' (2011) study demonstrates that playful learning experiences have a significant influence on the holistic development of the child socially, academically and personally, all of which contributes to the successful learning of the child. Similarly, Dickey, Castle and Pryor (2016) found that when children do not experience play at school, they are missing out on cognitive, psychical, socio-emotional and academic developments that occur through play. It became evident from analysing the studies that play-based learning experiences have a compelling role in the overall development of a child personally, socially and academically. A huge array of learning skills is possible, including communication, conflict resolution and social awareness of others. Pyle, Poliszczuk and Danniels (2018) further discuss that play experiences provide an appropriate and age-friendly experience for children to develop social skills and awareness in a way that is natural to a child.

Structured and Unstructured Play

One of the aims of this research was to critically analyse structured and unstructured play and to establish which approach to playful learning was most suitable and effective. It became evident after reading a number of studies that one approach was not more popular or efficient than the other. Both styles of play demonstrated benefits for learning if used at appropriate times, which depended on the teachers' planned outcomes for the learning experience. Breathnach, O Gorman and Danby (2016) discuss the role of the teacher as being the most significant element of play and not if the play is structured or unstructured. Across the international papers studied, it was clear that there is a gap in educational policies when instructing teachers on the best way to implement playful learning at primary level. The absence of prescribed direction has allowed educators to use their professional judgement and autonomy when implementing play in their classroom.

Armstrong and Sutherland (2020) assert that structured play or ‘free play’ is a playful experience that provides students with opportunities to create their own learning in an unstructured setting without direct adult control. In this style of play, students are free to make their own decisions and experience play as they see fit. Throughout the research, results show that teachers are less likely to implement this style of play for a variety of reasons and, therefore, this style of play occurs less in classrooms for educational purposes. Lynch (2015) found that teachers felt unstructured or free play environments were looked down upon by colleagues and such classrooms were not considered ‘serious’ or ‘academically focused’. Breathnach, O Gorman and Danby (2016) further point to the implementation of unstructured play as limited due to the fact that students with full control over their play may not choose to engage in the play in a way that the teacher would have liked them to.

Structured play experiences were noted to play a role in meeting curricular goals and aims due to the teacher being in a position to guide and enforce play that ensures specified learning occurs. Pyle, Poliszczuk and Danniels (2018) state that within structured play, the student should direct their own learning in a way that can be supported by the teacher or assisted by the teacher as 'co-player'. Pyle, Poliszczuk and Danniels (2018) shared that within their research, class teachers were uncertain about how to implement guided play as they struggled to find the balance between teacher-led instruction and child-led free play while ensuring that learning occurs. However, the above literature acknowledges that guided and facilitated play showed the highest level of literacy development across the studies. With the implementation of the new Primary Language Curriculum, and its support for actively involving students in their learning, there is a suitable opportunity for structured play within the Irish curriculum at primary level.

Schwarzmueller and Rinaldo (2013) discuss how free play in the classroom is an appropriate learning strategy, but the play must provide opportunities for students to explore curriculum-based learning objectives in a natural and playful way. Colliver and Arguel (2016) state that in recent years, there has been increased pressure within education that academic performances and achievements be met at younger ages, which has impacted the decision of whether to implement structured or unstructured play in the classroom. Both structured and unstructured play have opportunities for development and learning to occur, academically and socially. These findings demonstrate that in order to meet curricular aims through play, structured play is a more appropriate approach to take. An unstructured play experience could be implemented to develop the social and personal skills of the students, helping them grow as students in an independent approach.

Teachers' Role During Play

The role of the class teacher during the play experience is an undefined role within official educational policy in the countries examined in this study. While there is a significant amount of research on playful learning that schools could consider and implement as part of their policies, the research points to teachers having almost full control over playful learning in their classrooms and decisions being made are left to them. The role of the class teacher within a playful learning experience is commonly seen as the scaffolding facilitator, not an explicit instructor (Walsh and Fallon, 2019).

Hunter and Walsh (2014) emphasised that teacher intervention in play must be conducted with meaning to ensure the child's learning experience is worthwhile. However, teachers shared uncertainty in their specific role within the play. The teachers agreed they should be involved in the students' play; however, they couldn't express exactly what they should be doing. In the NCCA (2009, p.56) Aistear documentation and guidelines, the class teacher 'provides children with the support, props, time, and space to develop their play'. The NCCA also note that the role of the teacher can take many forms, but it is key for the adult to know when to intervene and when to allow children to lead. Similarly, Breathnach, O Gorman and Danby (2016) shared that the class teacher should direct the play when appropriate, ensuring meaningful learning occurs. The class teacher should have the autonomy to decide if the play is structured or

unstructured, establishing what the aim of the play is and which style of play will meet this.

Conclusion

The researcher used existing literature and policies to analyse the views of educational stakeholders at primary level regarding play and play-based learning experiences. The study considered findings from 2011–2021, which at times presented challenges due to the ten-year time frame. The findings of this research demonstrate the impact play-based learning can have in the primary school classroom and why teachers should consider play as a meaningful medium for teaching and learning. When engaged in play, students can experience opportunities to develop their social and academic skills, which influence student growth and personal development (Martlew, Stephen and Ellis, 2011).

Considering whether to implement structured or unstructured play is an area that causes widespread debate within the literature. While this research set out to establish which approach of play had more impact for suitable learning to occur, the findings demonstrate strengths in both styles of play. Lastly, the research suggests that the role of the educator in play experiences as a facilitator and scaffolder is key to its effectiveness. Pyle, Poliszczuk and Danniels (2018) note that the most important position a teacher can take in play is one that supports in the role of 'co-player'. Despite play-based learning offering advantages as potentially a powerful tool of learning, Smith (2010) highlights the importance for educators to understand that play provides more than an opportunity for development. During play-based learning, children also develop and build upon intrinsic motivation — something that is required later in schooling years and life (Smith, 2010).

References

Appleton, J.V. and Cowley, S. (1997) 'Analysing clinical practice guidelines: a method of documentary analysis', *Journal of Advanced Nursing*, 25(5), pp.1008–1017.

Armstrong, T. and Sutherland, D. (2020) 'Let them play! A call for play-based instruction in pre-K physical education', *Journal of Physical Education, Recreation and Dance*, 91(8), pp.5–7. [Online] Available at: https://www.tandfonline.com/doi/full/10.1080/07303084.2020.1800340 (Accessed: 01 March 2021).

Breathnach, H., O'Gorman, L. and Danby, S. (2016) '"Well it depends on what you'd call play": parents perspectives on play in Queensland's preparatory year', *Australasian Journal of Early Childhood*, 41(2), pp.77–84. [Online] Available at: https://eprints.qut.edu.au/87758/13/87758.pdf (Accessed: 18 January 2021).

Brooker, L. and Edwards, S. (2010) *Engaging play.* McGraw Hill Open University Press.

Canning, N. (2007) 'Children's empowerment in play'*, European Early Childhood Education Research Journal*, 15(2), pp.227–236. doi: 10.1080/13502930701320966.

Colliver, Y. and Arguel, A. (2016) 'Following in our footsteps: how adult demonstrations of literacy and numeracy can influence children's spontaneous play and improve learning

outcomes', *Early Child Development and Care*, 188(8), pp.1093–1108. doi: 10.1080/03004430.2016.1248958.

Cooper, H. (1998) *Applied social research methods. Synthesizing research: a guide for literature reviews.* 3rd edn. New York: Sage Publications.

Dickey, K., Castle, K. and Pryor, K. (2016) 'Reclaiming play in schools', *Childhood Education*, 92(2), pp.111–117. [Online] Available at: https://www.tandfonline.com/doi/full/10.1080/00094056.2016.1150742 (Accessed: 13 March 2021).

Dodgson, M. (2017) 'Innovation and play', *Innovation*, 19(1), pp.86–90. [Online] Available at: https://www.tandfonline.com/doi/full/10.1080/14479338.2016.1264863 (Accessed: 22 March 2021).

Dolya, G. (2009)*. Vygotsky in action in the early years: the 'key to learning' curriculum*. London: Routledge.

Flick, U. (2007) *Designing qualitative research*. London: Sage Publications.

Hunter, T. and Walsh, G. (2014) 'From policy to practice: the reality of play in primary school classes in Northern Ireland', *International Journal of Early Years Education*, 22(1), pp.19–36. [Online] Available at: https://www.tandfonline.com/doi/abs/10.1080/09669760.2013.830561 (Accessed: 27 January 2021).

Lynch, M. (2015) 'More play, please: the perspective of kindergarten teachers on play in the classroom', *American Journal of Play*, 7(3), pp.347–370. [Online] Available at: https://eric.ed.gov/?id=EJ1070249 (Accessed: 01 October 2020).

Martlew, J., Stephen, C. and Ellis, J. (2011) 'Play in the primary school classroom? The experience of teachers supporting children's learning through a new pedagogy', *Early Years: An International Journal of Research and Development*, 31(1), pp.71–83. [Online] Available at: https://www.tandfonline.com/doi/full/10.1080/09575146.2010.529425 (Accessed: 30 January 2021).

Martin, M. C. (2016) 'The state of play: historical perspectives', *International Journal of Play*, 5(3), pp.329–339. [Online] Available at: https://www.tandfonline.com/doi/full/10.1080/21594937.2016.1244025 (Accessed: 30 March 2021).

National Council for Curriculum and Assessment (NCCA) (2009) *Aistear: the early childhood curriculum framework*. [Online] Available at: https://ncca.ie/media/4151/aistear_theearlychildhoodcurriculumframework.pdf (Accessed: 07 September 2020).

Pyle, A., Poliszczuk, D. and Danniels, E. (2018) 'The challenges of promoting literacy integration within a play-based learning kindergarten program: teacher perspectives and implementation', *Journal of Research in Childhood Education*, 32(2), pp.219–233. [Online] Available at: https://tspace.library.utoronto.ca/bitstream/1807/96540/3/The%20challenges%20of%20promoting%20literacy%20within%20a%20play-based%20learning%20kindergarten%20program.pdf (Accessed: 14 February 2021).

Riley, J.G. and Jones, R.B. (2010) 'Acknowledging learning through play in the primary grades', *Childhood Education*, 86(3), pp.146–149. [Online] Available at: https://doi.org/10.1080/00094056.2010.10523135 (Accessed: 31 March 2021).

Russell, C. (2005) 'An overview of the integrative research review', *Progress in Transplantation*, 15(1), pp.8–13. [Online] Available at: https://www.researchgate.net/publication/7898657 (Accessed: 30 March 2021).

Schwarzmueller, G. and Rinaldo, V. (2013) 'The importance of self-directed play', *Kappa Delta Pi Record*, 49(1), pp.37–41. [Online] Available at: https://www.tandfonline.com/doi/full/10.1080/00228958.2013.759848 (Accessed: 27 January 2021).

Scott, D. and Morrison, M. (2007) *Key ideas in educational research*. London: Bloomsbury Publishing plc.

Smith, P.K. (2010) *Children and play.* John Wiley and Sons, Incorporated.

Thomas, G. (2013) *How to do your research project*. 2nd edn. Sage Publications.

Torraco, R. (2005) 'Writing integrative literature reviews: guidelines and examples', *Human Resource Development Review*, 4(3), pp.356–367. [Online] Available at: https://doi.org/10.1177/1534484305278283 (Accessed: 27 February 2021).

Walsh, G., McGuinness, C. and Sproule, L. (2019) '"It's teaching … but not as we know it": using participatory learning theories to resolve the dilemma of teaching in play-based practice', *Early Child Development and Care*, 189(7), pp.1162–1173. [Online] Available at: https://doi.org/10.1080/03004430.2017.1369977 (Accessed: 22 January 2021)

Walsh, G. and Fallon, J. (2019) '"What's all the fuss about play?" Expanding student teachers' beliefs and understandings of play as pedagogy in practice', *Early Years*. [Online] Available at: https://doi.org/10.1080/09575146.2019.1581731 (Accessed: 31 January 2021).

Whittemore, R. (2007*)* 'Top 10 tips for beginning a program of research'*, Research in Nursing & Health*, 30(3), pp.235–237.

The Teaching of Students with English as an Additional Language (EAL) from a Mainstream Primary Teacher Perspective

Adele Ward

Biography

After graduating with a Bachelor's Honours Degree from University of Limerick in Business Studies with German, Adele Ward has worked for numerous years within the advertising and marketing industries in both Ireland and Germany. She was responsible for developing strategic marketing, communication and advertising campaigns (digital, social and traditional) for a diverse range of clients. Adele had long harboured a desire to work as a primary school teacher and having recently graduated with a First-Class Honours in the Professional Master of Education (PME) in Primary Education from Hibernia College in 2022, she has finally fulfilled this dream. She is currently teaching Third Class pupils in a primary school in East Cork. Teaching provides Adele with the opportunity to have a positive impact on the lives of children and help develop a range of fundamental skills for adulthood. She has an ongoing passion for learning and would like to pass on that love for learning to the next generation. The ultimate reward for Adele is knowing that she is helping to nurture the development of children through education, thus providing a solid foundation for their future lives and career paths.

The Teaching of Students with English as an Additional Language (EAL) from a Mainstream Primary Teacher Perspective, by Adele Ward

Research Supervisor: Christine O'Shea

Abstract

This integrative literature review (ILR) critically analyses the issues and challenges Irish mainstream primary teachers encounter when teaching children with English as an additional language (EAL). Findings uncovered a lack of systematic, relevant EAL-focused training for pre-service teachers in their teacher training programmes, along with an acknowledgement of the importance of Continuous Professional Development (CPD) in the development of teachers' EAL knowledge and skills. Differentiated EAL teaching methodologies are utilised to support EAL learners, albeit in an ad hoc manner. Findings demonstrate a lack of standardised EAL assessment regulation and identified that assessment tools show no differentiation between language and learning difficulties. Conflicting beliefs on home language utilisation in the classroom were identified, with cultural diversity described as a positive influence within the school environment. The findings also provided further research and teacher practice recommendations to facilitate mainstream primary teachers in effectively supporting EAL learners with their language and learning development.

Keywords: EAL, pre-service teacher training, Continuous Professional Development, teaching methodologies, assessment, home language, inclusion, mainstream primary classroom

Introduction and Background

According to the 2016 census (Central Statistics Office, 2022), 96,497 non-Irish national students, who are five years of age and over, live in Ireland. The Irish education system 'respects the diversity of values, beliefs, languages and traditions in Irish society' (*Education Act, 1998*, p.5*).* To accommodate the changing dynamics and linguistic diversity of the Irish education system, the need to strategically 'create intercultural learning environments' (Department of Education and Skills, 2012b, foreword) was recognised, which stimulated the development of new linguistic policies and supports to cater for EAL learners. However, when a deeper analysis of EAL government-led guidelines, documents and supports was conducted, a strong detachment of EAL policy from the realities of mainstream primary classroom practice was identified. This dissertation explores the issues and challenges encountered by Irish mainstream primary teachers in effectively supporting EAL learners in their classroom. EAL is defined as English being the primary teaching language, with the aim of building on literacy and language skills children have utilised and developed when learning their own native language (National Council for Curriculum and Assessment, 2006). The central tenet of this dissertation originated during the first and advanced school placements, where the researcher's class students included an EAL student with a limited knowledge of the

English language and several Ukrainian refugee children with zero English language knowledge. From a personal viewpoint, the researcher had not received any training in teaching EAL students and, therefore, lacked the confidence, relevant skills and expertise to effectively teach EAL students. This piqued the researcher's interest to explore how mainstream primary teachers can effectively support EAL students to ensure they receive access to enjoy a fully inclusive education.

Background to EAL Irish Education Policy

In response to the influx of widespread immigration during the 1990s due to a buoyant Irish economy, the Refugee Language Support Unit (RLSU) — reconstituted as Integrate Ireland Language and Training (IILT) in 2001 — was established by the Department of Education and Skills (DES) in 1999 as an impetus to provide English language programmes and in-service teacher support (DES, 2012b). *English as an additional language in Irish primary schools: guidelines for teachers* was published in 2006 to assist mainstream primary school teachers in facilitating the learning requirements of EAL students (NCCA, 2006). EAL students were entitled to two years' English language support through Language Support Teachers (LSTs) who were allocated to schools based on the individual profiles of EAL students attending the school (Department of Education and Science, 2007; 2009). However, the economic downturn in 2008 had a detrimental effect on government spending, resulting in the closure of the IILT and consequent cutbacks in the allocations of language support and resources (Gardiner-Hyland and Burke, 2018). *Circular 0013/2017* details where support services are combined into one single Special Education Teaching (SET) allocation, which has responsibility for EAL students and children with special education needs (SENs) (DES, 2017). This circular, however, denotes only a token reference to EAL students and provides little guidance to schools on how to support EAL learners (Gardiner-Hyland and Burke, 2018). A supportive document entitled *Primary language curriculum support material for teachers* (NCCA, 2019b) aimed to provide guidelines on assisting the teacher in developing EAL students' language and literacy skills. While commendable, such support provides top-line advice without detailed strategies for different levels of EAL requirements.

Irish EAL Policy and Practice — The Reality

Second Language Acquisition (SLA)

The primary school curriculum introduction (NCCA, 1999, p.15) states that 'language has a vital role to play in children's development'. This is particularly noteworthy in the process of second language acquisition (SLA) for EAL learners. Krashen's (1981) SLA theory identifies that the home language (L1) is used as a basis to develop competency in the second language (L2), particularly when used for communicative purposes. While EAL students may achieve fluency in conversational language within the current policy's two-year cap on language support provision, it is, however, extremely unlikely that proficiency in academic language skills is attained (Wallen and Kelly-Holmes, 2006). While there is currently some discretion to this two-year cap, depending on individual schools' circumstances (DES, 2019a), this EAL policy highlights the government's failure to consider EAL learners' individual needs and their ongoing integration into the learning environment (Wallen, no date).

Pre-Service and In-Service EAL Teacher Training

A key priority identified by mainstream primary school teachers is the requirement for pre-service and in-service training that specifically focuses on EAL pedagogical practices (Kelly, 2014). Nowlan (2008) acknowledges that teachers have limited training, resources and information and recommends that language and intercultural awareness be included in pre-service teacher training. Teachers tend to use a trial-and-error approach depending on the success or failure of their EAL teaching methodologies (Gardiner-Hyland and Burke, 2018). Murtagh and Francis (2012) highlight the importance of qualified teachers engaging with relevant CPD training in the teaching of EAL. *English as an additional language in Irish primary schools: guidelines for teachers* (NCCA, 2006) purports relevant supports, resources and guidance for teachers, but it is worrying to note that 16 years after its publication, streamlined pre-service and in-service training policies and procedures are yet to be put in place to effectively support mainstream primary teachers in their teaching of EAL students.

EAL Learner Inclusion

According to Dillon (2012), linguistic skills previously learned in the EAL's native language are transferable when learning English, thus highlighting the importance of the role of the first language (L1) in acquiring new languages. However, in practice, the EAL learners are immersed in the language of instruction (English) resulting in ignoring or suppressing their native language (Kelly, 2014). Rodríguez-Izquierdo and Darmody (2019) state that language learning and integration tend to flourish in environments that promote and support diversity and cultural recognition. This is acknowledged by the NCCA (2005, p.165) in recommending mainstream classroom teachers to 'demonstrate a positive attitude towards language and linguistic diversity'. However, Baumgart (2012) states that the aspirations of EAL policies and classroom realities clash as although teachers are theoretically ready, they are not sufficiently trained to have the necessary skills and tools to work effectively in a multicultural classroom. Following an exploration of EAL policies, the following research questions emerged to address:

1. How are pre-service and in-service training perceived by mainstream primary teachers in terms of providing EAL learners with a fully inclusive education?
2. What teaching supports are currently being utilised by mainstream primary teachers in their classrooms to effectively accommodate EAL students with both their classroom learning and language development?

Methodology

The qualitative methodology used in this dissertation is the integrative literature review (ILR), a type of research that explores, analyses and synthesises literature on a specific topic, which allows for alternative perspectives on the topic to be generated (Torraco, 2005). In this instance, the ILR explores and synthesises literature, containing both qualitative and quantitative research methodologies, to examine specific issues and challenges encountered by mainstream primary teachers in supporting EAL students. The ILR's objective is to examine the literature through a carefully defined lens — in this case, the posed research questions — which enables a critical evaluation of relevant aspects of existing research and the development of succinct conclusions (ibid.).

Through the execution of the ILR process, the researcher aspires to utilise the resultant conclusions to facilitate her ability to effectively support EAL students in her future teaching practice.

Integrative Literature Review (ILR)

When an ILR is being conducted, the process involved should apply similar scientific rigour as is applied when carrying out primary research (Russell, 2005). The framework for conducting a review was developed by Cooper in 1998, and while it is deemed to align predominantly with a systematic review, it is also suitable for alternative review methods (Whittemore and Knafl, 2005). To address this, a modified framework is introduced specifically to the ILR process (ibid.) and includes the following five stages:

Stage One — Problem Formulation

For the purposes of this dissertation, the initial stage of the ILR process involved the selection of a specific research topic. Professional experience to date, an active interest in the subject matter and a consultation with a supervisor resulted in the development of a research problem. This led to active exploration, reading and reflection on research literature relevant to the subject matter — the issues and challenges mainstream primary teachers encounter in supporting EAL students in their classroom. As a result of the initial investigation carried out on the relevant literature within this topic, specific research questions were formulated.

Stage Two — Literature Search

Having completed the initial research, various specific terms were identified and deemed relevant to the literature search: EAL, English as an additional language, ESL, English as a second language, second language acquisition, ELL, English language learners, pre-service training, in-service training, teaching methods and language support. Four databases were used to search for research data — Academic Search Complete, Education Source and ERIC (each is part of EBSCOhost), as well as Taylor and Francis. The specific search terms were applied using Boolean logic in the *Title* and *Subject Terms* fields when searching the Academic Search Complete, Education Source and ERIC databases and in the *Abstract* field when searching the Taylor and Francis database, as detailed below.

- In *Title* or *Abstract*: "EAL OR ESL OR ELL" OR "English language learners" OR "English as an additional language" OR "English as a second language" OR "second language acquisition"
- In *Subject Terms*: "teaching strategies" OR "teaching methods" OR "teacher training" OR "in-service training" OR "pre-service training" OR "language support" OR teaching*
- In *Subject Terms*: "primary school" OR "elementary school" OR "primary education" OR "elementary education" OR "national school"

Adherence to additional criteria is realised in researching studies that were both peer-reviewed and published within the last ten years (January 2012–January 2022), to ensure the data and insights are current, relevant and valid. Additionally, all the articles were written in the English language. These parameters returned a total of 545 results — 111 from ERIC, 3 from Education Source and 431 from Taylor and Francis.

Stage Three — Evaluation

The total results figure was subsequently reduced and refined by screening research study titles to determine relevancy, reading both abstracts and introductions of selected studies and focusing on the following specific criteria:

- Explores and explicitly connects with the research questions
- Primary research has been carried out with particular reference to primary schools
- Clearly identifies the methodologies utilised
- Includes participant details
- Detailed information is provided on the process of data analysis
- Limitations are acknowledged.

Overall, 55 abstracts were read, which resulted in 23 articles being fully read and evaluated, with 12 papers in total being finally selected.

Stages Four and Five — Analysis and Presentation

Once the selection of the twelve papers was completed, a summary table was developed, which contained pertinent information on each of the articles, including the name of the author, the purpose of the study, the size of the sample, an overview of the methodology and a summary of the findings. A qualitative thematic analysis of the data, based on Braun and Clarke's (2006) influential model, was utilised. With the content of the research questions at the core of the analytical process, the twelve papers were read and subsequently re-read to enable the researcher to become increasingly familiar with the study content and, in particular, with the findings and discussion sections. Initial ideas were generated, which were coded and developed into broader themes. A review of these themes was conducted against all twelve papers to ascertain coverage and application, resulting in the creation of a thematic map. Each theme was systematically examined in the context of the data in the twelve research papers and how this data aligned with the posed research questions.

This research adhered to the standards provided by the *Ethical guidelines for educational research* (BERA, 2018). To clearly illustrate and visualise primary source comparisons on differing variables, the collation of data using tables is recommended (ibid.). Consequently, this project extracted relevant data from each of the twelve research studies, which was then incorporated into differing thematic tables. The researcher avoided suppressing conflicting findings through the systematic thematic analysis process based on Braun and Clarke's (2006) framework. Of particular importance was ensuring the selected research data was ethically conducted. This was evident where only those research studies with appropriate information regarding critical elements such as participants, context and research methods were ultimately included in the research analysis.

Data Analysis

The twelve peer-reviewed papers selected were published in the years 2012 to 2021. Of these papers, nine used qualitative methodologies and three a mixed-method approach. No quantitative studies met the necessary criteria and, therefore, they were not selected. Almost all the selected papers explore issues and challenges from the perspective of the mainstream primary classroom teacher, with respect to teaching EAL learners, at all stages of their teacher education continuum, from pre-service training through to working as fully qualified teachers. Such a perspective garnered limited research from Ireland, hence international research from England and the United States was also included, where similarities emerged in relation to both teacher instruction and teacher training. Sample sizes in the twelve chosen articles ranged from 4 to 116 participants. A variety of data generation methods were used throughout these twelve papers. Qualitative methods included semi-structured interviews (individual and group), classroom observations and focus groups. Quantitative methods included surveys. Table 1 below presents a summary of the twelve selected articles, which includes the names of the authors, dates of article publication, purpose of each study, methodological approach and the articles' findings.

Table 1 — Summary of Selected Papers

	Authors	**Purpose**	**Sample**	**Methodology**	**Findings and Summary**
1.	Bailey and Marsden (2017)	To investigate the potential of the implementation of home language pedagogies in a primarily monolingual area and to determine teachers' perceptions of such pedagogies	All participants were teachers or head teachers at primary schools in a local authority (LA) in the North of England. Seven teachers in two different primary schools in the LA were interviewed and observed. 55 teachers from 10 different primary schools in the LA (20% of the schools in the LA) responded to the survey.	Mixed methods, including classroom observations, interviews with the observed teachers and a survey administered to a large pool of teachers	Significant obstacles to the potential implementation of multilingual home language pedagogies in a primarily monolingual area were identified. Most of the teachers, while not dismissing the use of home languages, were not aware of how to use, and why they should use, home languages. Teachers who lacked confidence in linguistic diversity tended to have a lower willingness to implement home language classroom tasks and activities. Concern was highlighted around the formal use of home languages in the classroom (e.g. grammar, literature or the written language). Context-specific experience and training was highlighted as potentially being one factor affecting the teachers' lower willingness to implement home language classroom practices.

2.	Bailey and Sowden (2021)	To investigate primary school professionals' viewpoints regarding literacy teaching approaches they use for EAL learners	Five participants drawn from primary education, ranging in status from newly qualified teacher (NQT) to head teacher	Qualitative approach — interviews using a semi-structured technique	Findings revealed elements of good teaching practice such as inclusive classroom environments with differentiated learning. Emerging practices included ongoing communication between the school and parents, as well as assessment of students with EAL. Due to a lack of deep multilingualism knowledge, the participants were unable to utilise the home language to foster development of English reading and vocabulary. Teaching strategies needed to be more EAL-specific, specifically in relation to subjects reliant on language skills.
3.	Daniel (2014)	To examine how and what pre-service elementary teachers learned about educating English language learners (ELLs) in elementary school settings	Four pre-service elementary teacher candidates (three female and one male) taking part in a Master's with Certification in Elementary Education programme (MCEE) at a university	Qualitative, case study methodology. This included semi-structured interviews with student teachers and teacher educators, teacher training programme process observations and the collection of artefacts and documents from the programme. Additionally, two surveys were carried out with the entire student cohort (n=16), one each at the beginning and end of their programme, as well as a focus group interview with four student teachers (separate to the four focal participants). Over 100 hours of teacher education class meetings were observed and eight teacher educators were interviewed.	Five major findings were identified — four were challenges in guiding student teachers to practise and embrace linguistically and culturally responsive pedagogy, and the fifth was more positive by highlighting ways the pre-service teachers had opportunities to learn to provide an equitable and effective education to all students. Challenges included lack of discussion about effective EAL education within placement schools, as well as lack of modelling by mentors in the ways teachers can support ELLs in collaboration with teacher colleagues and in the development of caring relationships with ELL students. The positive finding identified that teacher candidates learned to practise linguistically responsive pedagogy through interactions with the ELL students.

4.	Demie and Lewis (2018)	To investigate how schools have helped pupils with EAL to achieve high standards and to identify significant common themes for success in narrowing the achievement gap	8 case study schools (5 primary and 3 secondary) with above-average proportion of students with EAL. Interviews with 8 headteachers, 8 assistant headteachers, 5 deputy headteachers, 3 inclusion managers, 2 special education needs coordinators, 15 class teachers, 8 teaching assistants, 3 learning mentors, 55 pupils with EAL and 5 parents	Qualitative approach including case studies, focus groups and observations. Case studies included open-ended, semi-structured interviews with headteachers, teachers, support staff, parents and students. Focus group interviews included parent, student, governor and headteacher focus groups. Nine lesson observations were carried out.	Findings of the research identified strategies used by schools to successfully increase the achievement levels of students with EAL. These included providing strong leadership with a specific focus on diversity and equality; a comprehension of the pedagogic practices that provide the best support for students with EAL; targeted support; an inclusive school environment that celebrates and recognises students' diverse cultural backgrounds; and the use of effective student assessment procedures, ongoing tracking of students' progress and performance data for school improvement.
5.	Deng and Hayden (2021)	To explore and identify the beliefs that pre-service teachers (PSTs) have in relation to teaching multilingual learners	116 undergraduate PSTs — 91% female — pursuing certificates in general elementary education or special education teaching. Approximately 7% of the sample participants were also studying for an ESL endorsement.	Qualitative in the form of a survey, which addressed four separate dimensions of teachers' multilingualism beliefs: 1. The interconnected nature of language with identity and culture 2. Valuing multilingualism 3. Understanding language demands 4. Responsibility of language teaching	While the PSTs' beliefs concerning multilingual students were overall positive, the PSTs' understandings and stances of the four dimensions of multilingualism were affected by the endorsement in ESL and their proficiency in a second language. At a granular level, conflicting beliefs were revealed, specifically in relation to the use of the home language, how quickly English is acquired when it is not spoken in the ELL's home and how to facilitate ELLs who are struggling to become proficient in the English language.

6.	Murtagh and Francis (2012)	To investigate the provision of language support for newcomer children with limited English language skills into Irish schools and the role language support teachers (LSTs) play within this process	38 LSTs based in inner city and suburban primary schools (representing schools of different social class backgrounds in an urban setting) with a significant student population containing diverse nationalities	Mixed-method approach, which included semi-structured interviews with LSTs and a postal survey. The postal survey included closed items (Likert scales and binary/multiple-choice items) and open-ended items (general comments referring to the provision of language support).	LSTs clearly understood their role in developing the English language skills of newcomer pupils to facilitate full integration into and inclusion in the school life. However, they recognised they were ill-prepared for the role, citing a lack of both pre-service and in-service training specific for EAL teaching. Two years allocated to language support was deemed insufficient for children with EAL to obtain adequate English language skills necessary to effectively access the curriculum. A mixture of teaching formats was used, including group withdrawal and in-class support. Concerns were expressed regarding the validity and reliability of the PSAK assessment test. Access to quality teaching resources was identified as necessary to support EAL learners.
7.	Olds, McCraney, Panesar-Aguilar and Cale (2021)	To explore how elementary teachers apply ELL instructional strategies and perceive how those strategies support academic achievement of ELLs	11 elementary mainstream general education teachers	Qualitative approach using semi-structured teacher interviews that contained open-ended questions	Teachers referenced ELL-specific strategies as best practice and applied them to the entire class, including non-ELLs. A variety of familiar instructional strategies were used to support ELLs' academic needs. Building language connections to the ELL's home language is important for their language acquisition and conceptual understanding. Teachers identified a need for additional relevant professional development to appropriately address ELLs' academic needs.

8.	Pray, Daniel and Pacheco (2017)	To determine the perspectives of elementary teachers on the functional systems that both positively and negatively impact on their teaching ability to support ELLs	Participants were part of four levels of enquiry: 1st level — 26 teachers (1st and 2nd cohorts) 2nd level — 16 teachers (all from 2nd cohort) 3rd level — 5 teachers 4th level — 3 teachers	Qualitative — interim and exit surveys, semi-structured interviews, field notes, observation	Teachers believed district and school management did not possess sufficient knowledge of instructional practices that fully supported ELLs, which in turn negatively impacted their own pedagogical practice. Teachers identified the issue of marginalisation of ELLs, demonstrated through a lack of availability of ELL-specific CPD opportunities and a disregard of ELLs' proficiency in both their home language and the English language in terms of mandated assessment practices.
9.	Rizzuto (2017)	To examine how the pedagogical practices of early childhood teachers are shaped by their perceptions toward ELLs in their classrooms	10 female early childhood teachers teaching in grades from pre-kindergarten through to second grade. One was a Spanish teacher who worked with the other 9 teachers and their students, servicing all the early childhood grades.	A transformative, parallel mixed-method analysis: qualitative, which included semi-structured interviews, Eight observations of each participant during literacy instruction and the gathering of material artefacts (e.g. home-school communication); and quantitative, which included a survey to measure teachers' perceptions towards their ELL pupils	7 out of the 10 teachers displayed negative perceptions towards their ELL pupils, which adversely affected their ability to effectively teach such students. These teachers lacked an understanding of how a second language is acquired and had concerns about the use of the ELL's home language in the classroom. They indicated they were not pedagogically equipped to effectively teach literacy to their ELL pupils. Their lessons lacked special supports and differentiated instruction for linguistically and culturally diverse students, resulting in the provision of a diluted curriculum.
10.	Szecsi, Lashley, Nelson and Sherman (2017)	To explore teachers' perspectives on the use and effectiveness of ELL language assessment, as well as the most effective pedagogical ELL practices	Five teachers (two kindergarten teachers, three third grade teachers and one paraprofessional who assists ELLs)	Qualitative methodology, which included both interviews and classroom observations	Most of the teachers did not feel they were accountable for the usefulness of the assessment results provided. However, some acknowledged the importance of the link between assessment results and planning relevant and appropriate instruction and carrying this out accordingly. Teachers' request for bilingual assessment identified their comprehension of how subject area knowledge and language acquisition should be assessed separately. A variety of teaching strategies were used to support ELLs, which focused on social language and academic vocabulary development, as well as sentence structure.

					These included visuals, graphic organiser, explicit vocabulary instruction and peer tutoring. To be able to select and implement effective strategies, teachers must understand the student's proficiency level and language-related needs from the assessment results.
11.	Wallen and Kelly-Holmes (2017)	To 'awaken' the language awareness of mainstream teachers, particularly in relation to EAL learners, using dialogic inquiry	Six primary school teachers (all female), five of whom were mainstream teachers and one of whom was an English language support teacher. They represented three primary schools.	Qualitative — transcripts from 8 evening meetings that took place to facilitate dialogue, semi-structured interviews, whole group discussion	Overall, findings intimate that a dialogic inquiry, taking the form of a teacher network, facilitates primary teachers in becoming more acutely aware of the first and second language acquisition process, the language learning stages, the use of the home language in the classroom and language learning motivation in relation to their students with EAL.
12.	Wissink and Starks (2019)	To explore the perceptions of elementary teachers of how effective their pre-service teaching programmes were in preparing them to teach ELLs	Five elementary teachers with less than five years' work experience	Qualitative — instrumental case study. This included a questionnaire, two on-site individual interviews, classroom observations and a group interview.	More ELL-specific coursework in teacher education preparation programmes should be included to prepare teachers for the realities of teaching. To support teachers with their teaching of ELLs, reading coursework should include a specific focus on how to teach emergent readers. Student teacher placements should include additional time teaching, working and reading with ELL pupils in an inclusive classroom environment. Learning another language is of benefit to teachers as it can assist them in understanding the difficulty in language learning, as well as supporting their teaching of ELL learners who speak the same language.

Findings and Discussion

Following a detailed analysis of the twelve articles using Braun and Clarke's (2006) thematic analysis model, three overarching themes and six subthemes emerged, which are illustrated in Table 2. These themes were then critically discussed in the context of the twelve selected articles, as well as broader literature and policies.

Table 2 — Themes and Subthemes

Theme	EAL Training	Support for Students with EAL	Inclusion
Subthemes	Pre-service Training	Differentiation in Teaching Strategies	Home Language and Bilingualism
	Continuous Professional Development (CPD)	Assessment	Cultural Diversity

EAL Training

Five studies (Murtagh and Francis, 2012; Daniel, 2014; Bailey and Marsden, 2017; Wissink and Starks, 2019; Deng and Hayden, 2021) highlighted a definitive lack of streamlined EAL-specific training received by pre-service primary teachers in teacher training programmes in the utilisation of different course content and teacher educator instruction. Bailey and Marsden (2017) demonstrate that in some instances, student teachers were not afforded the opportunity to participate in any EAL training during their teacher-training course. A deficiency in the ability of mentors in placement schools to support and develop the EAL skills and knowledge of student teachers, to actively model differentiated ELL teaching practices and promote effective collaboration with their English for speakers of other languages (ESOL) teaching colleagues (Daniel, 2014), was alarming.

Overall, CPD opportunities were found to be beneficial to EAL teaching practices of mainstream primary teachers, enabling them to provide a fully inclusive education. Olds et al.'s (2021) findings were interesting as 6 of the 11 respondents expressed a requirement for EAL CPD, with two requesting full training and four requesting a review training. This finding highlights the varying requirement levels of CPD based on prior experiences. Murtagh and Francis (2012) report that over two-thirds (68%) of LSTs indicated that they had availed of language support CPD training, with three-quarters of respondents stating the level of training received was good. According to Bailey and Sowden (2021), CPD opportunities focusing on home language inclusion techniques were perceived as being invaluable as none of the participants stated positive attributes that language diversity could bring to the classroom. An unexpected finding in Rizzuto (2017) illustrates that some teachers cited their wealth of experience garnered throughout lengthy teaching careers as a reason for not requiring CPD. Collaboration with other teachers was also seen as extremely effective in EAL knowledge and skill development, even more helpful than CPD (Murtagh and Francis, 2012).

Support for Students with EAL

Even with the evidential lack of relevant EAL pre-service training, findings uncovered a variety of differentiated teaching strategies used to facilitate and support the language and learning needs of EAL learners, albeit in an ad hoc manner. Adult modelling, talk frames and talk partners were identified as effective EAL classroom teaching strategies to scaffold language development (Demie and Lewis, 2018). Talk frames assisted the movement towards effective writing and talk partners enabled students to practise and discuss language, with teachers acknowledging that group and pair work provided

effective scaffolding and English language models for EAL learners (ibid.). To facilitate the development of social language, specific vocabulary was incorporated into daily activities such as break time (Szecsi et al., 2017). The development of academic vocabulary was supported by pre-teaching the relevant vocabulary before group reading, explaining word meanings through the use of pictures, and putting the word in different sentences to illustrate how to use it (ibid.).

To scaffold EAL learners' learning development, one teacher identified that some ELLs lacked prior experiences to foster critical thinking and comprehension of a particular book or story but built these pre-reading requirements by conversing with the students, using peer-readers and creating new experiences by taking nature walks, depending on the ELLs' needs (Rizzuto, 2017). All teachers in the research conducted by Wissink and Starks (2019) confirmed the use of gestures, actions or hand motions as useful in communicating with ELLs, with three teachers using teacher modelling to express ideas. Bailey and Sowden (2021) identified that EAL learners were assisted in accessing the curriculum through visual images, multimodal methods (albeit limited) and the introduction of new vocabulary in a targeted manner, specifically at the outset of a new concept being taught.

Teachers adapted and customised curriculum resources and developed new ones to support the learning of EAL learners (Pray, Daniel and Pacheco, 2017; Szecsi et al., 2017; Wissink and Starks, 2019). Elementary teachers addressed their ELLs' learning needs by creating and customising curriculum resources by incorporating additional visuals and culturally relevant images into lessons (Wissink and Starks, 2019). To facilitate ELLs from social and academic perspectives, participants in Szecsi et al. (2017) used visual resources such as graphic organisers for vocabulary teaching and the creation of flipbooks, vocabulary charts and picture usage to illustrate meaning. As district and school management were deemed by the teachers in Pray, Daniel and Pacheco (2017) to lack expertise and to have minimal involvement in ELL-focused instructional practices, the teachers innovatively amended top-down mandates to meet their ELLs' needs by developing new resources and creating customised guided reading books.

However, with no standardised teaching strategy system in place to successfully support all EAL learners, poor EAL teaching instruction was also evident (Bailey and Sowden, 2012; Rizzuto, 2017; Olds et al., 2021). Interestingly, teachers used ELL-focused strategies such as word banks, sentence frames and visuals to support the learning of all their students, including non-ELLs (Olds et al., 2021). Bailey and Sowden (2012) highlight that one of the study's participants did not provide additional language support for an EAL student, even though the teacher stressed the pupil was in the bottom section for numeracy and literacy. Seven out of ten teachers held negative beliefs about their ELL pupils, which adversely impacted their ELL literacy instruction development and resulted in a diluted curriculum in the form of ELL-only groups and an overuse of non-related workbooks (Rizzuto, 2017).

Research findings demonstrate a definitive lack of systematic EAL assessment regulation and sensitivity, resulting in the use of a variety of different evaluation tools, which was reported in the findings of a number of the research articles. All survey respondents in Murtagh and Francis (2012) who used the Primary School Assessment Kit (PSAK) to

assess the English proficiency level of students expressed concerns regarding its validity and reliability. Szecsi et al. (2017, p.24) uncovered a critical flaw in language assessments, which crucially did not distinguish between ELLs' language difficulties and learning difficulties, with one teacher stating, 'these assessments don't always show what ELLs are truly capable of doing', and several teachers stating that students should be enabled to 'test in the language they are fluent in'. In direct contrast, Demie and Lewis (2018) identified protocols to differentiate between EAL learner needs and SENs by using assessments in the mother tongue, interpreters and assessments with independent agencies. Bailey and Sowden (2021) expose a fragmented implementation approach to EAL assessment as an inconsistency in the use and formal recording of assessments as well as an uncertainty in relation to the assessment of EAL children in their native language. It is interesting to note that the headteacher in this study was the only respondent that acknowledged the importance of assessing EAL children through their home language, reflecting the difference between cognitive ability and language ability (ibid.).

Inclusion

Conflicting beliefs in relation to the use of the EAL learners' home language in the classroom to support SLA and bilingualism, that which encourages inclusion, were evident across the selected papers. Building connections from the home language was identified as being instrumental in scaffolding SLA by nine of the eleven participants in Olds et al.'s (2021) research through translations and enabling spaces for pupils to hear or speak prompts in their home language (ibid.). One of the participants, named Sandra (a pseudonym), in the Bailey and Sowden (2021) study was an advocate of immersing the children with EAL in English yet also used translation of the home language in the classroom to assist in English vocabulary acquisition. Her colleague, Natasha, consistently used translation practices to facilitate English literacy development using online programmes, dictionaries, multilingual teaching assistants, other students and parents, thus scaffolding the translanguaging of emergent bilinguals. The use of native language was encouraged through drama, talk partners and Talk for Writing, where EAL learners rehearse the English words before communicating them to other pupils or presenting them in in written form. This approach facilitated the transfer of language and literacy skills developed during their native language learning towards learning in the English language (Demie and Lewis, 2018). A finding of note was how a teacher's proficiency in a second language and linguistic competence affected their confidence and knowledge of the use of the home language in translanguaging, ranging from positive interactions to negative didactic teaching approaches (Bailey and Marsden, 2017; Deng and Hayden, 2021).

Cultural diversity was celebrated and perceived as a positive in all of the studied papers, illustrated through the school ethos, visual displays of different cultures, community links, and inclusive classroom activities such as the utilisation of bilingual story books and traditional native stories of the student with EAL (Bailey and Marsden, 2017; Demie and Lewis, 2018). Almost two-thirds of surveyed respondents stated that the whole school benefited when EAL learners were students in the school as such students foster a learning environment of other cultures, nationalities and languages, with one respondent commenting, 'There is a better atmosphere of interculturalism in the school, a rich diversity and this is good for all children' (Murtagh and Francis, 2012, p.208). Such

appreciation and respect directly align with Irish policy, which acknowledges classroom cultural and linguistic diversity (NCCA, 2005).

Conclusion

The study highlighted the insufficient availability of EAL-focused pre-service training, which can negatively impact the learning environment. Given the ongoing demographical change in Ireland and the resultant findings that pre-service teachers are currently in receipt of insufficient EAL-focused training, it is considered prudent from a research and policy perspective to explore potential protocols and frameworks for the compulsory provision of standardised, systematic EAL-specific training within all Irish teacher training programmes. The importance of CPD in developing teachers' knowledge and skills to effectively meet EAL learners' needs has been affirmed in this research. Various EAL supports were identified as being implemented by mainstream primary teachers in their classrooms. However, findings revealed a haphazard implementation of differentiated EAL teaching strategies to support the learning and language development of EAL learners, with identified challenges such as lack of linguistic competence and confidence. This highlights the lack of availability of a standardised, systematic EAL-specific programme to help mainstream primary teachers to effectively support the language and learning development of EAL learners in their classroom. As a result, further research into teachers' perspectives of such EAL teaching methodologies is needed to inform Irish policy on the need for the development of a national, systematic, standardised programme that caters for different EAL requirement levels. Such a programme could then be implemented and used throughout the learning continuum of a child with EAL.

References

Bailey, E.G. and Marsden, E. (2017) 'Teachers' views on recognising and using home languages in predominantly monolingual primary schools', *Language and Education*, 31(4), pp.283–306.

Bailey, L. and Sowden, H. (2021) 'Reflective accounts of teaching literacy to pupils with English as an additional language (EAL) in primary education', *English in Education*, 55(4), pp.286–300.

Baumgart, J. (2012) 'Looking at multicultural classrooms in Ireland: teacher educators' perspectives', in Farr, F. and Moriarty, M. (eds.) *Language, learning and teaching: Irish research perspectives*. Oxford: Peter Lang, pp.113–129.

Braun, V. and Clark V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp.77–101. [Online] Available at: https://www.tandfonline.com/doi/abs/10.1191/1478088706qp063oa (Accessed: 15 December 2021).

British Educational Research Association (BERA) (2018) *Ethical guidelines for educational research*. [Online]. Available at: https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018-online (Accessed: 15 December 2021).

Central Statistics Office (CSO) (2022) *Census of population 2016 — Profile 7 migration and diversity.* [Online] Available at: https://www.cso.ie/en/releasesandpublications/ep/p-cp7md/p7md/p7se/ (Accessed: 08 December 2021).

Daniel, S. (2014) 'Learning to educate English language learners in pre-service elementary practicums', *Teacher Education Quarterly*, 41(2), pp.5–28.

Demie, F. and Lewis, K. (2018) 'Raising achievement of English as additional language pupils in schools: implications for policy and practice', *Educational Review*, 70(4), pp.427–446.

Deng, Q. and Hayden, H. (2021) 'How preservice teachers begin to develop equitable visions for teaching multilingual learners', *Peabody Journal of Education*, 96(4), pp.406–422.

Devine, D. (2005) 'Welcome to the Celtic Tiger? Teacher responses to immigration and increasing ethnic diversity in Irish schools', *International Studies in Sociology of Education*, 15(1), pp.49–70.

Dillon, A. (2012) 'Supporting home language maintenance among children with English as an additional language in Irish primary schools', *WPEL*, 27(2), pp.76–94. [Online] Available at: https://www.researchgate.net/publication/324721354_Supporting_Home_Language_Maintenance_among_Children_with_English_as_an_Additional_Language_in_Irish_Primary_Schools (Accessed: 28 December 2021).

Education Act 1998, Dublin: The Stationery Office.

Gardiner-Hyland, F. and Burke, P. (2018) '"It's very hard to know how much is the EAL and how much is the learning difficulty": challenges in organising support for EAL learners in Irish primary schools', *LEARN: Journal of the Irish Learning Support Association*, 40, pp.54–64. [Online] Available at: https://www.researchgate.net/publication/330347732_It's_very_hard_to_know_how_much_is_the_EAL_and_how_much_is_the_learning_difficulty_Challenges_in_organising_support_for_EAL_learners_in_Irish_primary_schools (Accessed: 13 December 2021).

Ireland. Department of Education and Science (2007) *Circular 0053/2007: meeting the needs of pupils for whom English is a second language*. Dublin: DES.

Ireland. Department of Education and Science (2009) *Circular 0015/2009: meeting the needs of pupils learning English as an additional language*. Dublin: DES.

Ireland. Department of Education and Skills (2012b) *English as an additional language in primary schools in 2008: inspectorate evaluation studies.* [Online] Available at: https://assets.gov.ie/25307/955de2b2fa99424ab7c3d51ebd79a5a7.pdf (Accessed: 10 December 2021).

Ireland. Department of Education and Skills (2017) *Circular no 0013/2017: circular to the management authorities of all mainstream primary schools — special education teaching allocation.* [Online] Available at: https://assets.gov.ie/12768/ca1cbebc2e764367a9611b23b5886073.pdf (Accessed: 10 December 2021).

Ireland. Department of Education and Skills (2019 *Circular no 007/2019: circular to the management authorities of all mainstream primary schools — special education teaching allocation*. [Online] Available at: https://circulars.gov.ie/pdf/circular/education/2019/07.pdf (Accessed: 13 December 2021).

Kelly, N. (2014) 'Does equal access mean treat the same? From theory to practice in the classroom of English as an additional language learner in Ireland — towards a transformative agenda', *International Journal of Inclusive Education*, 18(9), pp.857–876.

Krashen, S.D. (1981) *Second language acquisition and second language learning*. Oxford: Pergamon Press Inc.

Murtagh, L. and Francis, T. (2012) 'Supporting pupils with EAL and their teachers in Ireland: the need for a co-ordinated strategy', *Language and Education*, 26(3), pp.201–212.

National Council for Curriculum and Assessment (NCCA) (1999) *Primary school curriculum introduction*. [Online] Available at: https://www.curriculumonline.ie/getmedia/c4a88a62-7818-4bb2-bb18-4c4ad37bc255/PSEC_Introduction-to-Primary-Curriculum_Eng.pdf (Accessed: 15 December 2021).

NCCA (2005) *Intercultural education in the primary school*. [Online] Available at: https://www.curriculumonline.ie/getmedia/236745b0-a222-4b2a-80b1-42db0a3c7e4c/Intercultural-Education-in-Primary-School_Guidelines.pdf (Accessed: 10 December 2021).

NCCA (2006) *English as an additional language in Irish primary school: guidelines for teachers.* [Online] Available at: https://ncca.ie/media/1794/english_as_an_additional_language_in_irish_primary_schools_guidelines_for_teachers.pdf (Accessed: 10 December 2021).

NCCA (2019) *Primary language curriculum support material for teachers.* [Online] Available at: https://curriculumonline.ie/Primary/Curriculum-Areas/Primary-Language/Resources/Support-Materials/All-Strands-PLC-Support-Materials.pdf?ext=.pdf (Accessed: 15 December 2021).

Nowlan, E. (2008) 'Underneath the band-aid: supporting bilingual students in Irish schools', *Irish Educational Studies*, 27(3), pp.253–266.

Olds, J., McCraney, M., Panesar-Aguilar, S. and Cale, C. (2021) 'Adopting instructional strategies for English language learners in elementary classrooms', *World Journal of Education*, 11(3), pp.18–29.

Pray, L., Daniel, S. and Pacheco, M. (2017) 'Functional systems that afford and constrain elementary teachers' adaptation of instruction to support multilingual students', *International Multilingual Research Journal*, 11(4), pp.205–222.

Rizzuto, K. (2017) 'Teachers' perceptions of ELL students: do their attitudes shape their instruction?', *The Teacher Educator*, 52(3), pp.182–202.

Rodríguez-Izquierdo, R. and Darmody, M. (2019) 'Policy and practice in language support for newly arrived migrant children in Ireland and Spain', *British Journal of Educational Studies*, 67(1), pp.41–57.

Russell, C. (2005) 'An overview of the integrative research *review', Progress in Transplantation*, 15(1), pp.8–13.

Szecsi, T., Lashley, T., Nelson, S. and Sherman, J. (2017) 'Teachers' perspectives on language assessment and effective strategies for young English language learners in Florida', *International Journal of the Whole Child*, 2(2), pp.18–28.

Torraco, R. (2005) 'Writing integrative literature reviews: guidelines and examples', *Human Resource Development Review*, 4(3), pp.356–367. [Online] Available at: https://www.researchgate.net/publication/240698137_Writing_Integrative_Literature_Reviews_Guidelines_and_Examples (Accessed: 30 December 2021).

Wallen, M. (no date) 'The need for a long-term, comprehensive approach to EAL instruction in Irish schools'. [Online] Available at: https://www.naldic.org.uk/Resources/NALDIC/Professional%20Development/Documents/NQ436.pdf (Accessed: 20 December 2021).

Wallen, M. and Kelly-Holmes, H. (2006) '"I think they just think it's going to go away at some stage": policy and practice in teaching English as an additional language in Irish primary school', *Language and Education*, 20(2), pp.141–161.

Wallen, M. and Kelly-Holmes, H. (2017) 'Developing language awareness for teachers of emergent bilingual learners using dialogic inquiry', *International Journal of Bilingual Education and Bilingualism*, 20(3), pp.314–330.

Whittemore, R. and Knafl, K. (2005) 'The integrative review: updated methodology', *Journal of Advanced Nursing*, 52(5), pp.546–553. [Online] Available at: https://users.phhp.ufl.edu/rbauer/EBPP/whittemore_knafl_05.pdf (Accessed: 14 February 2022).

Wissink, B. and Starks, S. (2019) 'Elementary teachers' perceptions of preparedness to teach English language learners', *Educational Research and Reviews*, 14(10), pp.349–357.

HIBERNIA
COLLEGE